

SHOUT
SHARE **IT**







78
873
N.M.

University of the State of New York

New York State Museum

FREDERICK J. H. MERRILL Director

Bulletin 51 April 1902

CATALOGUE

OF

NEW YORK REPTILES AND BATRACHIANS

BY

EDWIN C. ECKEL

AND

FREDERICK C. PAULMIER Ph.D.



	PAGE		PAGE
Serpents of northeastern United States. EDWIN C. ECKEL		Distribution (<i>continued</i>)	
Introduction	356	Color key to species.....	365
Reference list.....	357	Specific descriptions Colubridae...	366
Classification and nomenclature.....	359	Specific descriptions Crotalidae....	385
Anatomic characters.....	360	Lizards, tortoises and batrachians	
Venomous and nonvenomous		of New York. F. C. PAULMIER	
snakes	361	Introduction	389
Nomenclature of the scales.....	361	Descriptions	390
Variation.....	362	Plate I Metamorphoses of Ba-	
Distribution	363	trachia.....facing	396
Key to genera.....	364	Collecting and preparing.....	407
		Index	410

ALBANY

UNIVERSITY OF THE STATE OF NEW YORK

1902

University of the State of New York

REGENTS

With years of election

1874 ANSON JUDD UPSON L.H.D. D.D. LL.D.

Chancellor, Glens Falls

1892 WILLIAM CROSWELL DOANE D.D. LL.D.

Vice-Chancellor, Albany

1873 MARTIN I. TOWNSEND M.A. LL.D. - - Troy

1877 CHAUNCEY M. DEPEW LL.D. - - - - New York

1877 CHARLES E. FITCH LL.B. M.A. L.H.D. - Rochester

1878 WHITELAW REID M.A. LL.D. - - - New York

1881 WILLIAM H. WATSON M.A. LL.D. M.D. - Utica

1881 HENRY E. TURNER LL.D. - - - - - Lowville

1883 ST CLAIR MCKELWAY M.A. L.H.D. LL.D. D.C.L. Brooklyn

1885 DANIEL BEACH Ph.D. LL.D. - - - - Watkins

1888 CARROLL E. SMITH LL.D. - - - - Syracuse

1890 PLINY T. SEXTON LL.D. - - - - Palmyra

1890 T. GUILFORD SMITH M.A. C.E. LL.D. - - Buffalo

1893 LEWIS A. STIMSON B.A. LL.D. M.D. — — New York

1895 ALBERT VANDER VEER Ph.D. M.D. - - Albany

1895 CHARLES R. SKINNER M.A. LL.D.

Superintendent of Public Instruction, ex officio

1897 CHESTER S. LORD M.A. LL.D. - - - - Brooklyn

1897 TIMOTHY L. WOODRUFF M.A. Lieutenant-Governor, ex officio

1899 JOHN T. McDONOUGH LL.B. LL.D. Secretary of State, ex officio

1900 THOMAS A. HENDRICK M.A. LL.D. - - - Rochester

1901 BENJAMIN B. ODELL JR. LL.D. Governor, ex officio

1901 ROBERT C. PRUYN M.A. - - - - - Albany

1902 WILLIAM NOTTINGHAM M.A. Ph.D. - - - Syracuse

SECRETARY

Elected by Regents

1900 JAMES RUSSELL PARSONS JR M.A.

DIRECTORS OF DEPARTMENTS

1888 MELVIL DEWEY M.A. *State Library and Home Education*

1890 JAMES RUSSELL PARSONS JR M.A.

Administrative, College and High School Dep'ts

1890 FREDERICK J. H. MERRILL Ph.D. *State Museum*

New York State Museum

FREDERICK J. H. MERRILL Director

Bulletin 51 April 1902

CATALOGUE OF NEW YORK REPTILES AND BATRACHIANS

PREFACE

Since the publication, by James E. De Kay,¹ of his report on the zoology of New York in 1842, and by Spencer F. Baird,² of the report on the serpents of New York state, great changes have been made in the nomenclature and classification of the reptiles and batrachians, and a number of new species and subspecies have been added to our fauna. The works named are, moreover, practically unobtainable, and no popular discussion of the subject is at present in print. The groups here treated are, in consequence, much less familiar to the general student than are the birds and mammals.

In view of these facts, it seemed desirable for the New York state museum, in pursuance of its definite policy of placing at the disposal of the citizens of this state trustworthy guides to the various biologic groups, to issue a catalogue of the New York species of reptiles and batrachians as at present known, accompanied by descriptions sufficient to make it possible for nonspecialists to identify these species. At the request of the director, this work was undertaken by the authors of the two papers published in the present bulletin.

Information regarding the occurrence and distribution of the various species is much to be desired; and local faunal lists would be of much value in this connection, while specimens sent to the state museum will be identified.

FREDERICK J. H. MERRILL

¹ De Kay, James E. Zool. N. Y. v. 3, pt 3, 1842.

² Baird, Spencer F. Serpents of New York. N. Y. state cab. nat. hist. 7th an. rep't. 1854.

SERPENTS OF NORTHEASTERN UNITED STATES

BY EDWIN C. ECKEL

INTRODUCTION

The following catalogue was commenced with the intention of including only such species of serpents as have been found within the limits of New York state, together with such other species as could, from occurrences in adjoining states, be reasonably expected to occur here. A preliminary check list, prepared on that basis by the author, and published recently in the *American naturalist*, contained 25 species and subspecies. This list was notably imperfect, of which fact no one was more conscious than its author; but it was the first attempt to formulate such a catalogue since Baird's list of 1854.

De Kay, in 1842, described 15 species of snakes as occurring in this state. To this list Gebhard added a sixteenth (*Storeria occipitomaculata*) in 1851, and a seventeenth (*Sistrurus catenatus catenatus*) in 1853. The present list names 19 species as inhabitants of New York state, one of these species however being represented by six subspecies. One additional species, (*Coluber vulpinus*) is added because of a single occurrence in Massachusetts; while the three remaining species have been found in Pennsylvania or New Jersey, but not in New York.

The total number of species and subspecies here described is 28, and the catalogue, as now issued, includes every species and subspecies authentically recorded from that portion of the United States lying north of Maryland and east of Ohio. Two additions may have to be made to this list in the near future. It is probable that some more southern representative of *Osceola doliata* than *O. d. triangula* will be found to occur in New Jersey or Pennsylvania; while there is a possibility that some of the Ohio specimens (from Lake Erie) identified as *Natrix fasciata erythrogaster* may really prove to be of that subspecies.

As noted later in this bulletin, I am greatly indebted to Messrs H. D. Reed of Cornell university, and W. Seward Wallace of New York, for hitherto unpublished data which they have placed at

my disposal. Mr Reed has further aided me by sending specimens from several localities in this state. It seems proper to point out here that Mr Wallace, in securing *Cyclophis aestivus* and *Pityophis melanoleucus* near Nyack N. Y., has made the first real addition to our local faunal list since 1853.

All the figures in this bulletin save those on pl. 1 are duplicates of those used in Cope's *Crocodylians, lizards and snakes of North America*, and are available for use here through the courtesy of the secretary of the United States national museum.

Reference list

The following list is not in any way complete, but it contains all faunal lists, relating to the area under consideration, noticed by the author. Several of the more important general works on American herpetology have been added because of localities given in their texts; and, in addition, certain papers by Cope have been cited because of their bearing on the matter contained in the section on variation. For explanation of asterisks, see p. 389.

The works are referred to in the bulletin by author and date.

- * **Abbott, C. C.** '68. Catalogue of the vertebrate animals of New Jersey. Geol. N. J. p. 801-3.
- * **Allen, Glover M.** '99. Notes on the reptiles and batrachians of Intervale, New Hampshire. Bost. soc. nat. hist. Proc. 29 : 63-75.
- * **Allen, J. A.** '69. Catalogue of the reptiles and batrachians found in the vicinity of Springfield, Mass.: with notices of all the other species known to inhabit the state. Bost. soc. nat. hist. Proc. 12 : 171-204.
- Baird, Spencer, F.** '54. On the serpents of New York; with a notice of a species not hitherto included in the fauna of the state. N. Y. state cab. nat. hist. 7th an. rep't, p. 95-124.
- * **Bicknell, E. P.** '82. Review of the summer birds of a part of the Catskill mountains, with prefatory remarks on the faunal and floral features of the region. Linn. soc. N. Y. Trans. 1 : 113-68.
- * **Cope, Edward Drinker.** '75. Check list of North American Batrachia and Reptilia. U. S. nat. mus. Bul. 1, p. 104.
- '92. Critical review of the characters and variations of the snakes of North America. U. S. nat. mus. Proc. 14 : 589-694.
- '93. The color variations of the milk snake. Am. nat. 27 : 1066-71, pl. xxiv-xxvii.
- '96. [Variations in *Osceola doliata*] Primary factors of organic evolution. N. Y. p. 29-41, fig. 2-11.
- * ——— 1900. Crocodylians, lizards and snakes of North America. U. S. nat. mus. Rep't. 1898. p. 153-1270, pl. 1-36.
- * **De Kay, James E.** '42. Natural history of New York; Zoology of New York. v. 3, pt 3, Reptiles and amphibia. 2 v. Alb.

- Ditmars, Raymond L.** '96. Snakes found within fifty miles of New York. Linn. soc. N. Y. Abstract and proc. no. 8, p. 9-24.
- Eckel, Edwin C.** 1901. Snakes of New York: an annotated check list. Am. nat. 35: 151-55.
- * **Fogg, B. F.** '62. List of reptiles and amphibians found in the state of Maine. Portland soc. nat. hist. Proc. 1: 86.
- Gebhard, John, jr.** '51. [Occurrence of *Storeria occipitomaculata* in New York state] N. Y. state cab. nat. hist. 4th an. rep't, p. 23.
- '53. [Occurrence of the *Massasauga*, *Crotalophorus tergeminus* in New York state] N. Y. state cab. nat. hist. 6th an. rep't, p. 22.
- * **Holbrook, J. E.** '42. North American herpetology. 5 v. Philadelphia 1842.
- * **Hough, Franklin B.** '52. Catalogue of reptiles and fishes, from St Lawrence county, procured for the state cabinet of natural history by Franklin B. Hough. N. Y. state cab. nat. hist. 5th an. rep't, p. 23-28.
- * **Jordan, David S.** '99. Manual of the vertebrate animals of the northern United States. Chicago. 1899.
- * **Kirtland, Jared P.** '38. Report on the zoology of Ohio. O. geol. sur. 2d an. rep't. p. 155-200.
- * **Linsley, James H.** '44. Catalogue of the reptiles of Connecticut. Am. jour. sci. 1st ser. 46: 37-51.
- * **Macauley, James.** '29. [Serpents of New York state] Natural, civil and statistical history of the state of New York, by James Macauley. 3 v. O. 1: 441, 513-17.
- * **MacKay, A. H.** '96. Reptiles and batrachians of Nova Scotia. Nova Scotian inst. of sci. Proc. ix: xli-xliii.
- * **Mearns, Edgar A.** '98. A study of the vertebrate fauna of the Hudson highlands. Am. mus. nat. hist. Bul. 10: 303-52.
- '99. Notes on the mammals of the Catskill mountains, New York, with general remarks on the fauna and flora of the region. U. S. nat. mus. Proc. 21: 341-60.
- * **Morse, Max.** 1901. Ohio reptiles in the Ohio state university zoological museum. Ohio naturalist. 1: 126-28.
- * **Nelson, Julius.** '90. Descriptive catalogue of the vertebrates of New Jersey. State geol. N. J. Final rep't. v. 2, pt 1, p. 643-48.
- Putnam, F. W.** '65. [On the species of the genus *Eutaenia* B. & G.] Bost. soc. nat. hist. Proc. 9: 60-62.
- '66. [Occurrence of worm snake in New England] Essex inst. Proc. iv: lxxxiii-lxxxiv.
- * **Reed, H. D.** 1901. Notes on the snakes of the vicinity of Ithaca, N. Y. (Manuscript placed at my disposal by the author)
- * **Smith, David S. C. H.** '33. [Catalogue of the] Reptilia [found in Massachusetts] Rep't geol. Mass. 1833. p. 552, 2d ed. 1835, p. 534.
- * **Smith, W. H.** '82. Report on the reptiles and amphibians of Ohio. O. geol. sur. Rep't. v. 4. Zoology and botany, p. 629-734.

- Stejneger, Leonhard.** '95. Poisonous snakes of North America. U. S. nat. mus. Rep't. 1893. p. 337-487, pl. 1-19.
- 1901. Eckel's Snakes of New York. Am. nat. 35: 428.
- ***Storer, D. H.** '39. Reports on the fishes, reptiles and birds of Massachusetts. Bost. p. 221-34.
- ***Thompson, Zadock.** '42. [Serpents of Vermont] History of Vermont, natural, civil and statistical, by Zadock Thompson. p. 115-19.
- ***Verrill, A. E.** '65. Catalogue of the reptiles and batrachians found in the vicinity of Norway, Oxford co. Maine. Bost. soc. nat. hist. Proc. ix: 195-99.
- '69. [Note on occurrence in Connecticut and Massachusetts of *Ancistrodon contortrix*] Bost. soc. nat. hist. Proc. xii: 249.
- Wallace, W. S.** 1901. Snakes of Rockland co., N. Y. Trans. Linn. soc. N. Y.
- Placed at my disposal, in manuscript form, by the author, and as yet unpublished.

CLASSIFICATION AND NOMENCLATURE

The paper here presented is designed for general use, and is issued as a guide to our local species of serpents, with a view to obtaining farther data concerning the occurrence, frequency and variations of these species in different parts of the area under consideration. In order to popularize the subject as far as possible, certain changes from the usual form of presentation have been adopted.

In giving the specific descriptions, synonymic lists have been omitted, and the scientific names under which each species is described by De Kay ('42) and Jordan ('99) respectively have been added. In addition to an artificial generic key of the common type, based on structural characters of more or less moment, a highly artificial key to the species, based so far as possible on tint and pattern of coloration, has been devised; which will be of service in determinations of living specimens.

Prof. Cope's grouping and terminology, as fully developed in his last work (Cope. 1900) on North American serpents, have been strictly adhered to. This close following of what will undoubtedly be for many years the standard general work on the subject, seemed desirable in a paper such as the present, purely preliminary in its nature, though the author's views on several of the forms treated are widely at variance with those advanced by Prof. Cope.

To the scientific name of each species, has been added that one of its common names which seems to be in most general use, or

which designates most correctly some character. In the few cases where such names did not exist, descriptive names have been coined.

Anatomic characters

Serpents, or snakes, are reptiles with highly elongate, cylindric bodies, covered with scales, this covering being shed entire at certain seasons of the year. External limbs are either, as in our species, entirely wanting, or very rudimentary. The mouth is capable of great distension, most of the bones of the head being united by ligaments or muscles only, and possessing therefore great freedom of motion. External ears are lacking; as are eyelids, the eye being protected by an immovable layer of transparent epidermis, which is shed with the skin. The tongue is forked, capable of protrusion, and retractible into a sheath. Teeth are always present, on both palatine bones and jaws. The digestive and respiratory organs are, like the general form, much elongated. The paired organs (lungs, etc.) are rarely bilaterally symmetric, one of the pair being usually rudimentary or wanting. The stomach is a simple enlargement of the digestive canal.

The snakes form a very compact and well marked group, easily separable by external characters from the nearest related forms. Among the lizards, it is true, certain serpentiform species occur, but not within the region covered by this paper.

But little definite information is at hand concerning the breeding habits of our snakes, even of the more common species. It is known that certain species are oviparous (laying eggs) while others are ovoviviparous (the egg being developed and the young hatched before exclusion from the body of the mother). From the scanty data obtainable it seems probable that the New York species belonging to the genera *Coluber*, *Zamenis*, *Cyclophis*, *Liopeltis*, *Osceola* and *Ophibolus* are all oviparous; while in those of *Storeria*, *Natrix*, *Eutaenia*, *Ancistrodon*, *Sistrurus* and *Crotalus* the young are brought forth alive, owing to an early breaking of the eggshell. The manner of birth of the species of *Diadophis*, *Carphophiops* and *Pityophis* is unknown; and it seems possible that in *Heterodon platyrhinus* both forms of birth may occur.

Venomous and nonvenomous snakes

Of the species occurring within the area here discussed, only three are venomous. These are the banded, or northern rattlesnake (p. 387); the massasauga, or prairie rattlesnake (p. 386); and the copperhead (p. 385). The three venomous species are closely related, all belonging to the family of Crotalidae, or pit-vipers, marked by the presence of erectile poison fangs on the upper jaw and by the presence of a deep pit between the eye and the nostril. The head is more or less markedly triangular in outline, and separated from the body by a relatively constricted neck. The rattles of the two species of rattlesnakes are of course an unmistakable characteristic. The copperhead bears no such distinguishing mark, and is frequently confused with the harmless hog-nosed snake, or blowing adder (p. 368); the water snake (p. 377) and occasionally even with the familiar milk snake (p. 374). A careful reading of the descriptions and inspection of the cuts given of these species, and comparison with those of the copperhead will make the points of difference clear.

Much attention has naturally been paid to the Crotalidae by American authors, and numerous papers on the subject have been published. By far the most valuable and comprehensive work on the venomous snakes of North America is that by Dr Leonhard Stejneger ('95), curator of reptiles and batrachians at the United States national museum, to which the reader is referred for a very detailed discussion of our poisonous snakes.

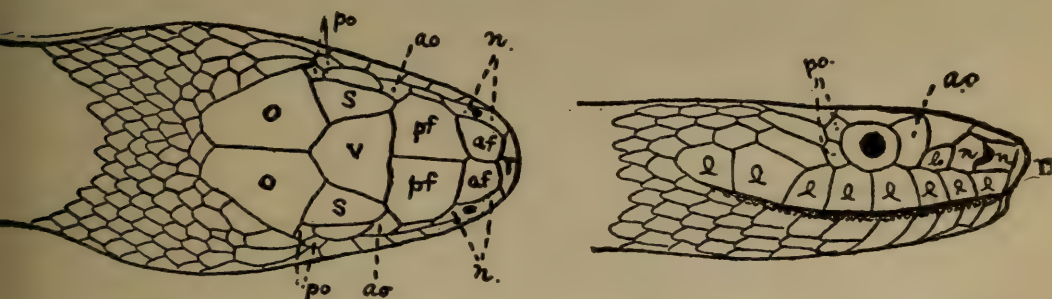


Fig. 1 Illustrating nomenclature of the head scales of serpents

Nomenclature of the scales

Certain terms frequently used in describing the characters of the species require definition here.

The vertical or frontal plate (*v*) is the central, shield-shaped plate

in the middle of the head above; on either side of it are the superciliary plates (*s*) lying immediately above the eye. The pair of plates immediately in front of the vertical are the prefrontals (*pf*); in front of these lie the internasals (*af*), while the plate terminating the muzzle, and lying in front of the prefrontals, is the rostral (*r*). The plates behind the superciliaries and vertical are the occipitals (*o*). The plates immediately behind the eye are the postoculars, or postorbitals (*po*); those in front of the eye are the preoculars, anteoculars or anteorbitals (*ao*), in front of which are the loreals (*lo*). Between the loreal and the rostral, and inclosing the nostril, are the nasal plates (*n*). The superior labials (*l*) margin the upper jaw; the inferior labials (not marked in figure) margin the lower jaw. The temporal plates lie between the superior labials and the occipitals.

The plates on the under side of the body, from the neck to the vent, are the abdominal plates, or gastrosteges; those from the vent to the end of the tail are the subcaudal plates, or urosteges. The *anal plate* is that immediately anterior to the vent. It may be entire, or divided by a longitudinal parting; and this difference is of value in the determination of the various snakes, as will be seen by reference to the artificial key to the genera (p. 364). The term, "scales in . . . rows," will often be found in the specific descriptions, the number of rows referred to in such case being the number of longitudinal rows of scales, excluding the abdominal series. *Keeled* or *carinate* scales show a ridge on the median line.

Variation

Of late years much attention has been paid by naturalists to the subject of variation in animals, and certain relations between color variations and geographic distribution seem to be well established.

Certain species of snakes show variations in color and color pattern to a remarkable degree, notable examples of this being the common garter snake and the familiar, though somewhat scarcer, milk snake. Prof. E. D. Cope paid particular attention to the variations in these species, and has discussed the subject in a long series of papers several of which are cited in the accompanying reference list (p. 357). As noted earlier in this bulletin (p. 359) the grouping adopted in the present paper follows the views which he advanced

in his last discussion (Cope. 1900) of the forms mentioned. It would seem, however, that of the species occurring within the area here considered *Eutaenia sirtalis* and *Osceola doliata* and, to a somewhat less degree, *Natrix fasciata*, require careful revision. With the scanty material at hand this is not possible at present for even the New York forms of those species, but a few very general notes will be found among the specific descriptions.

Melanism, more or less complete, has been noted briefly under the two of our species which seem to be most subject to it. In *Heterodon platyrhinus* (p. 368) the black coloration has undoubtedly no systematic importance. In regard to *Natrix fasciata sipedon* (p. 377), however, the case is somewhat different, as it would seem probable that in New York and New England specimens the darker coloration is general and not merely individual in its nature.

DISTRIBUTION

But little is known concerning the distribution throughout the state of the species here described. This lack of knowledge is particularly unfortunate because the reptiles, owing to their relatively low degree of mobility and restricted individual range would certainly seem to offer a much better basis for the definition of the faunal zones of any area than the birds or mammals. Local faunal lists giving details regarding the occurrence and abundance of the various species in different localities are therefore much to be desired. Such information on this subject as is now at hand has been appended to the specific descriptions. These brief notes are based on published papers by Dr Edgar A. Mearns ('98, '99), R. L. Ditmars ('96) and the author (1901); and on a manuscript list (1901) of the species found near Ithaca N. Y., which has been very kindly placed at my disposal by H. D. Reed, of Cornell university. A paper on the snakes of Rockland co. N. Y. (soon to be published in the transactions of the Linnaean society of New York) has also been placed in my hands in manuscript by its author, W. Seward Wallace, for use in the present bulletin. It will be noted that nearly all our information, therefore, relates to the eastern and more particularly the southeastern portion of the state. With the exception of Mr Reed's notes, I have only scattered data on occurrences in the central and northern portions of the state,

while not a single record has been obtained from the southern tier of counties adjacent to the Pennsylvania border. In view of the number of educational institutions and local scientific societies in New York state, it seems curious that so little attention has been paid to this question. Data on the subject will be very acceptable to the author, who will also be glad to identify specimens sent to the state museum. Directions for collecting will be found in another section of this bulletin (p. 407).

Key to genera

The following artificial key to the families and genera of the species of snakes occurring in the area discussed is based on structural characters, often of slight systematic value, and follows closely the lines of the generic key in Jordan ('99).

COLUBRIDAE

A. No pit between eye and nostril; upper jaw with small teeth; neck not constricted; head more or less elongate; top of head covered with plates; form, in general, slender

a Dorsal scales carinated

1) Anal plate entire

a) Scales in 19-21 rows..... *Eutaenia* (p. 381)

b) Scales in 27-31 rows..... *Pityophis* (p. 373)

2) Anal plate bifid

a) Scales in 15-17 rows

* Tail one third or more of total length. *Cyclophis* (p. 369)

** Tail less than one third of total length.. *Storeria* (p. 380)

b) Scales in 19-27 rows

* Rostral recurved; scales in 25 rows.. *Heterodon* (p. 368)

** Rostral not recurved; gastrosteges less than 170..... *Natrix* (p. 376)

*** Rostral not recurved; gastrosteges more than 170 *Coluber* (p. 371)

b Dorsal scales smooth

1) Anal plate entire

a) Head flattened..... *Osceola* (p. 374)

b) Head conical *Ophibolus* (p. 375)

2) Anal plate bifid

a) Scales in 17 rows..... *Zamenis* (p. 370)

b) Scales in 13 rows; head not distinct.. *Carpophiops* (p. 366)

c) Scales in 15 rows; superior labials 8..... *Diadophis* (p. 367)

d) Scales in 15 rows; superior labials 7..... *Liopeltis* (p. 369)

CROTALIDAE

- B. Deep pit between eye and nostril; upper jaw with erectile poison fangs; form stout; head more or less triangular; neck constricted; subcaudals entire
- a* Tail without rattle..... *Ancistrodon* (p. 385)
- b* Tail with small rattle; top of head covered with plates..... *Sistrurus* (p. 386)
- c* Tail with larger rattle; top of head covered with small scales..... *Crotalus* (p. 387)

Color key to species

The author has prepared a purely artificial key, based almost entirely on color and pattern, which is here appended. As it does not require handling of the specimen, it furnishes a convenient means of identifying live specimens whose specific character is in doubt. The numbers at the right refer to the similarly numbered specific descriptions which begin on p. 366 of this bulletin.

Owing to the great variation in color and pattern sometimes shown by individual specimens, identifications made by means of any key based purely on these characters must not be accepted as decisive, but should be verified by reading over the characters given in the specific descriptions, under the head of that species to which the key seems to point; and by careful comparison of the specimen with the figure given for each species.

- a* Color of back uniform; no marked spots, blotches or stripes
- Color green; scales smooth..... 4
- Scales rough..... 5
- Color black; no lighter markings..... 6
- Some scales white-edged..... 8
- Conspicuous yellowish neck ring..... 2
- Color reddish brown; below pink; head not distinct from body..... 1
- Color chestnut brown; below pink; head distinct from body..... 17
- Below grayish..... 16
- b* Striped longitudinally; with or without additional spots
- Striped black and brown; no spots..... 14
- Brown and yellow; no spots; abdomen unicolor; very slender.. 18
- Olivaceous and yellow or brown; dark spots on back and sides in several rows..... 20
- Greenish brown and brown; below reddish yellow, with dark spots..... 13
- c* Spotted, blotched or transversely banded above
- 1) No rattle; head tapering into neck and body, not triangular

- Color black, with narrow yellow cross lines; head black, spotted yellow..... 11a
- Brown to dark gray, with darker blotches; below clouded with reddish or yellowish..... 12a
- Reddish to purplish brown, darker blotches; below red, black spotted 15
- Light brown, with chocolate blotches; below yellowish white, black blotched... .. 7
- Gray to brown, with dark blotches; below yellowish to greenish yellow; rostral recurved 3
- Ashy gray, with brown saddle spots; below tessellated with black..... 10a
- Whitish, with chestnut blotches black margined; below yellowish..... 9
- Olivaceous to brownish, with black spots; below greenish white 20b
- 2) No rattle; head markedly triangular; neck constricted, distinct from body
- Color brownish, with darker blotches; top of head copper red; below yellowish, with dark spots.... .. 21
- 3) Tail terminating in a rattle; head very distinct, triangular, neck constricted
- Head covered with many small scales.... .. 23
- Head with a few large plates..... 22

A. COLUBRIDAE

Top of head covered with plates; no pit between eye and nostril; upper jaw with normal (solid) teeth, no poison fangs; neck not markedly constricted; head more or less elongate; subcaudals divided. Species all harmless.

1 *Carphophiops amoenus* (Say)

Worm snake

De Kay. *Calamaria amoena*
 Jordan. *Carphophiops amoenus*
 Head small, not distinctly marked off from body, frontal plate hexagonal, nearly as broad as long. Tail short, tapering to a point. Scales all smooth, in 13 rows.

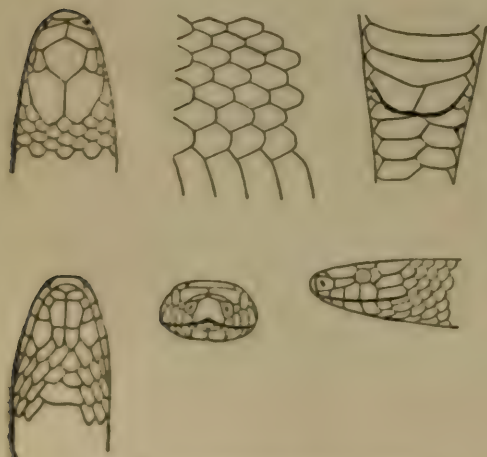


Fig. 2 *Carphophiops amoenus*

Above bright chestnut brown, very glossy; beneath, bright salmon color.

"Found under stones and logs." *De Kay*. '42

"Rare around Nyack. I have seen but one specimen, taken in 1899 at Blauveltville, Rockland co. N. Y." *Wallace*. 1901

Probably occurs quite commonly in all the northeastern states. Its small size, inconspicuous color, and habits render it difficult of detection, however. It is commonly found under stones or logs, or in fields during plowing.

2 *Diadophis punctatus* (Linn.)

Ring-necked snake

De Kay. *Coluber punctatus*

Jordan. *Diadophis punctatus*

Head much depressed, flattened above; snout rounded; body slender; tail tapering. Scales in 15 rows.

Bluish black above, with a yellow or yellowish white ring about neck; yellowish beneath, sometimes with spots. Length 18 inches.

"Found in every part of the state. Common under rocks and stones, and frequently seen under the bark of decayed trees." *De Kay*, '42, p. 40

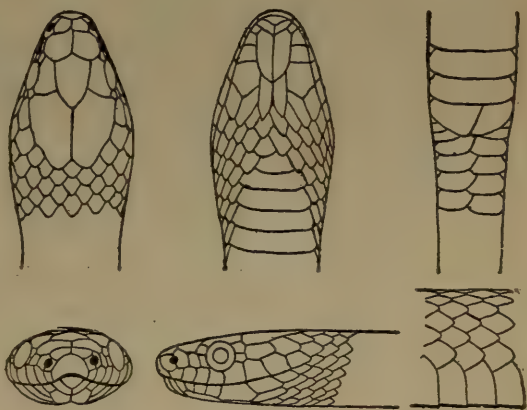


Fig. 3 *Diadophis punctatus*

"Quite numerous." *Mearns*. '98, p. 326

"Rare (near Ithaca)." *Reed*. 1901

"Quite frequent in Rockland county. I captured a single specimen at Coldspring Harbor, Long Island, in August, 1899." *Wallace*. 1901

This snake may be common in southeastern New York, but it is rarely seen. I have secured but a single specimen in that region, taken in June 1901 near Fishkill village, Dutchess co. N. Y.

3 *Heterodon platyrhinos* Latreille

Blowing adder

De Kay. *Heterodon platyrhinos*

Jordan. *Heterodon platyrhinos*

Body short and stout, tail very short and rapidly tapering. Scales markedly carinated. Rostral compressed and recurved. Scales in 25 rows.

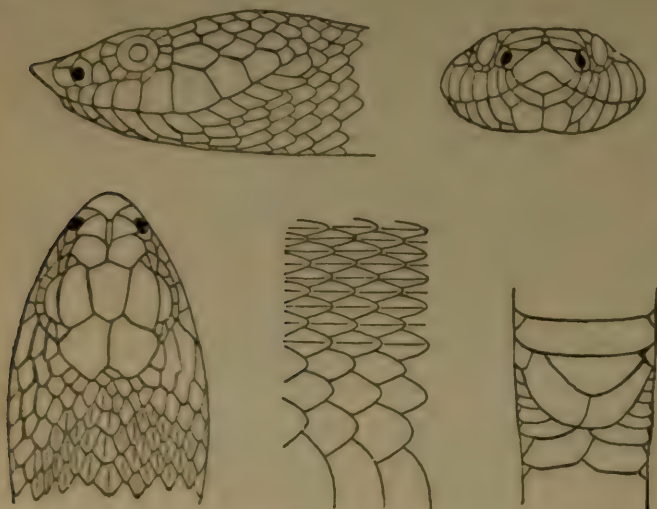


Fig. 4 *Heterodon platyrhinos*

Color yellowish gray to brown, with dark brownish to black blotches on back, becoming black, half rings on upper side of tail; beneath, yellowish to greenish yellow. Length 30 inches.

Melanistic individuals of this species seem to be quite com-

mon. They are recorded by Cope from Scarborough, Westchester co.; and have been taken by R. L. Ditmars in Sullivan county.

"Rather common in the southern parts of New York." *De Kay*. '42

"One of our common snakes" in the Highlands. *Mearns*. '98, p. 327

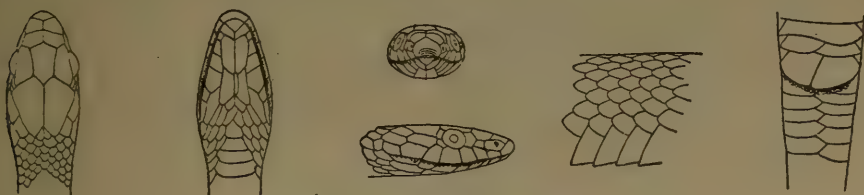
"Very common in sandy regions in Orange county and southern Westchester county." *Eckel*. 1901, p. 152

"Not at all common in Rockland county." *Wallace*. 1901

This species, though entirely harmless, is commonly regarded as venomous. When annoyed it flattens the anterior portion of its body, and hisses vigorously. Comparison of the above specific description and figures with those of the copperhead (p. 335) will show the numerous points of difference.

4 *Liopeltis vernalis* (De Kay)*Smooth green snake*De Kay. *Coluber vernalis*Jordan. *Liopeltis vernalis*

Head distinct; body slender. Scales smooth, in 15 rows. Tail less than one third of total length.

Fig. 5 *Liopeltis vernalis*

Above, green; yellowish to yellowish green beneath. Length 20 inches.

A somewhat smaller species than *Cyclophis aestivus* from which it is distinguished by its scales being smooth and in 15 rows, as well as by having a proportionately shorter tail.

Common in many parts of the state. De Kay '42, states that it is "very common in the marshes about Salina and Cayuga."

"Specimens taken on Staten Island, N. Y." *Ditmars*. '96, p. 14

"Still common in the Highlands." *Mearns*. '98, p. 326

"More common, I believe, in Orange county than east of the Hudson." *Eckel*. 1901, p. 152

"A number of specimens taken at Ithaca." *Reed*. 1901

"Quite common in Rockland county." *Wallace*. 1901

Specimens were taken by Baird near Westport, Essex co., and several have been sent to the state museum recently from Ausable Forks, Essex co. The species has been recorded as far north as Nova Scotia. (*MacKay*. '96.)

5 *Cyclophis aestivus* (Linn.)*Rough green snake*De Kay. *Leptophis aestivus*Jordan. *Opheodrys aestivus*

Head distinct; body slender. Scales strongly carinated, in 17 rows. Tail more than one third length of body.

Bright green above; light yellow below. Length 30 inches.

Distinguished from *Liopeltis vernalis*, our only other snake

resembling it in color, by having keeled scales in 17 rows; while *L. vernalis* has smooth scales, in 15 rows.

Commonly described as not occurring north of central New Jersey, but Ditmars ('96, p. 15) found it "quite common" in Plymouth county, Ct.

Mr W. Seward Wallace, in his paper on the snakes of Rockland county N. Y., mentions its occurrence in that area; and in a recent



Fig. 6. *Cyclophis aestivus*

letter to me states that he does "not believe it to be rare, though it is not often seen, owing to its small size and secretive habits." In view of these records it is probable that the species will be found to occur in all the other southeastern counties, or at least in Westchester county and on Long Island.

6 *Zamenis constrictor* (Linn.)

Black snake

De Kay. *Coluber constrictor*

Jordan. *Bascanion constrictor*

Head distinct; body elongate. Scales smooth, in 17 rows. Color, in adult: lustrous pitch-black above; beneath, greenish black to

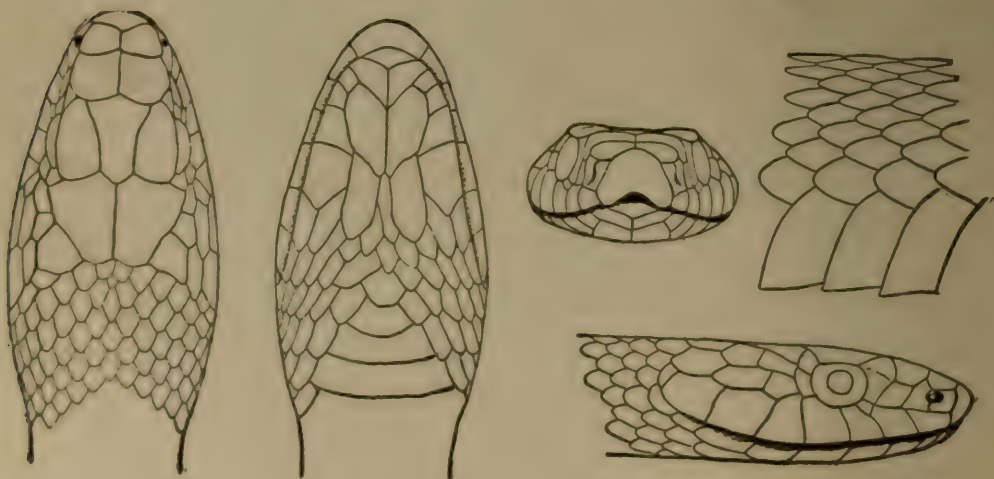


Fig. 7 *Zamenis constrictor*

yellow. Young, olive, with darker dorsal blotches. Length 50-60 inches.

"Formerly extremely abundant, now fairly so. A specimen taken May 25, 1883, measured 58 inches in length." *Mearns*. '98, p. 326

"A very common species, both relatively and absolutely, in southeastern New York." *Eckel*. 1901, p. 152

The department records show no evidence of a black snake having been taken in the vicinity of Ithaca since 1883. In all my collecting about here, for the past three years, I have never seen or heard of one. If any have been taken recently, the fact has not come to our notice. *Reed*. 1901

"Very common in Rockland county, attaining a large size." *Wallace*. 1901

7 *Coluber vulpinus* (B. & G.)

Fox snake

Jordan. *Callopeltis vulpinus*

Rostral broad; vertical plate broader than long. Scales in 27 rows (or occasionally 25); the nine dorsal rows carinated.

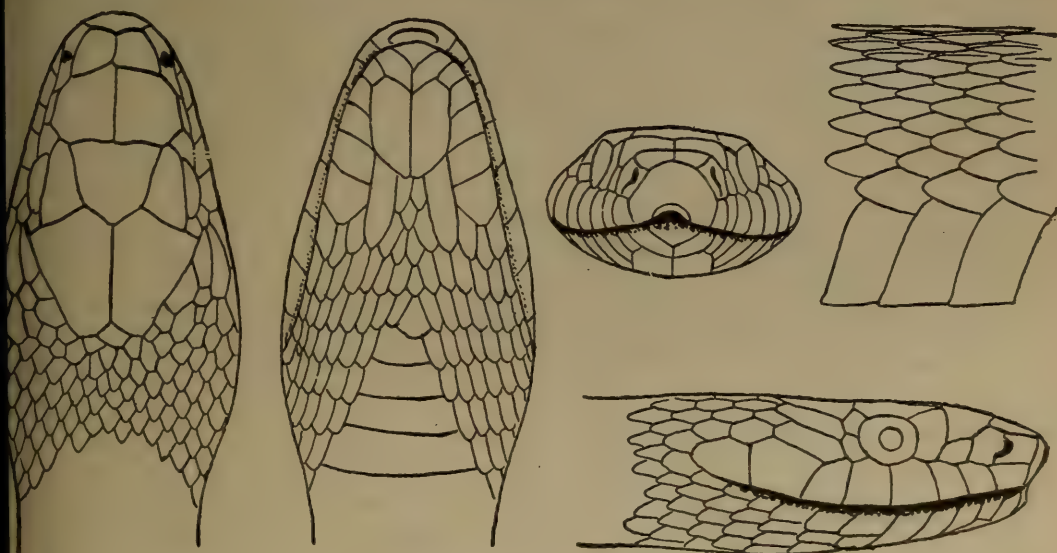


Fig. 8 *Coluber vulpinus*

Ground color above light brown, with a series of broad, transverse, quadrate, chocolate blotches; below yellowish white, with a series of subquadrate, black blotches on edge of abdomen, opposite to those of the dorsal series. Length 60 inches.

Included here because of one specimen, described by J. A. Allen

('69, p. 181) as captured in 1861 at Wenham Mass. No other specimen has ever been found within the area here discussed, and Cope (1900) states that it does not occur east of Illinois. Morse (1901), however, notes specimens from Ohio.

8 *Coluber obsoletus obsoletus* (Say)

Racer

De Kay. *Coluber alleghaniensis*

Jordan. *Callopeltis obsoletus*

Scales in 27 rows, the 17 dorsal rows keeled.

Color above, black or dark brown, with or without darker quadrangular blotches; occasional scales with white markings; greenish white to slate color below.

Length 50-75 inches.

Found in the Highlands.

De Kay, p. 37

"Formerly quite common; now rare." *Mearns*. '98, p. 327

"Occurs in Orange county (and probably east of the Hudson), though much scarcer than *Zamenis constrictor*. *Eckel*. 1901. p. 152

"Specimens captured near Ithaca, June 4, 1883, and summer of 1889; at Chittenango, by D. G. Gates, Ap. 27, 1889. A specimen 150 cm long captured alive at Newfield was sent to Cornell university in August 1899."

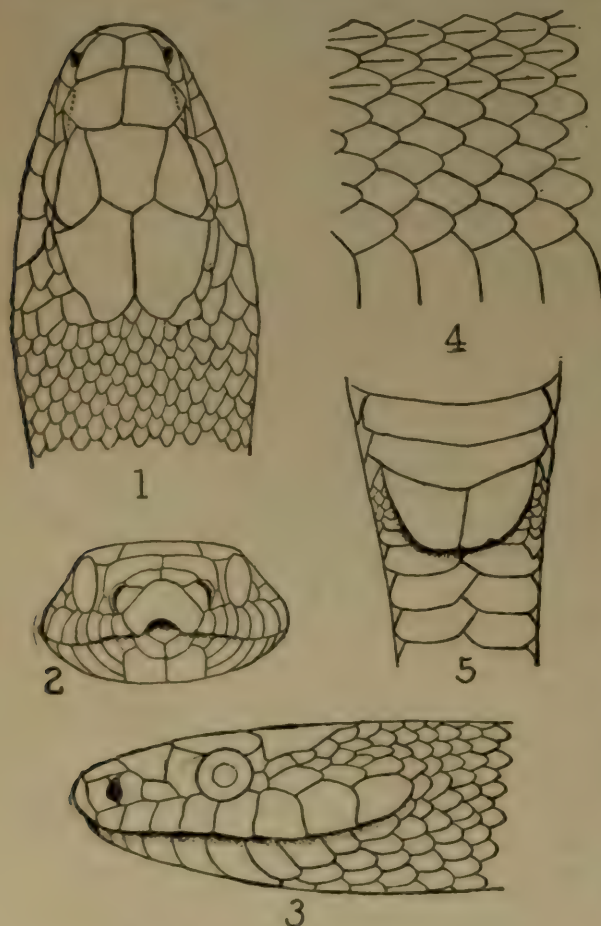


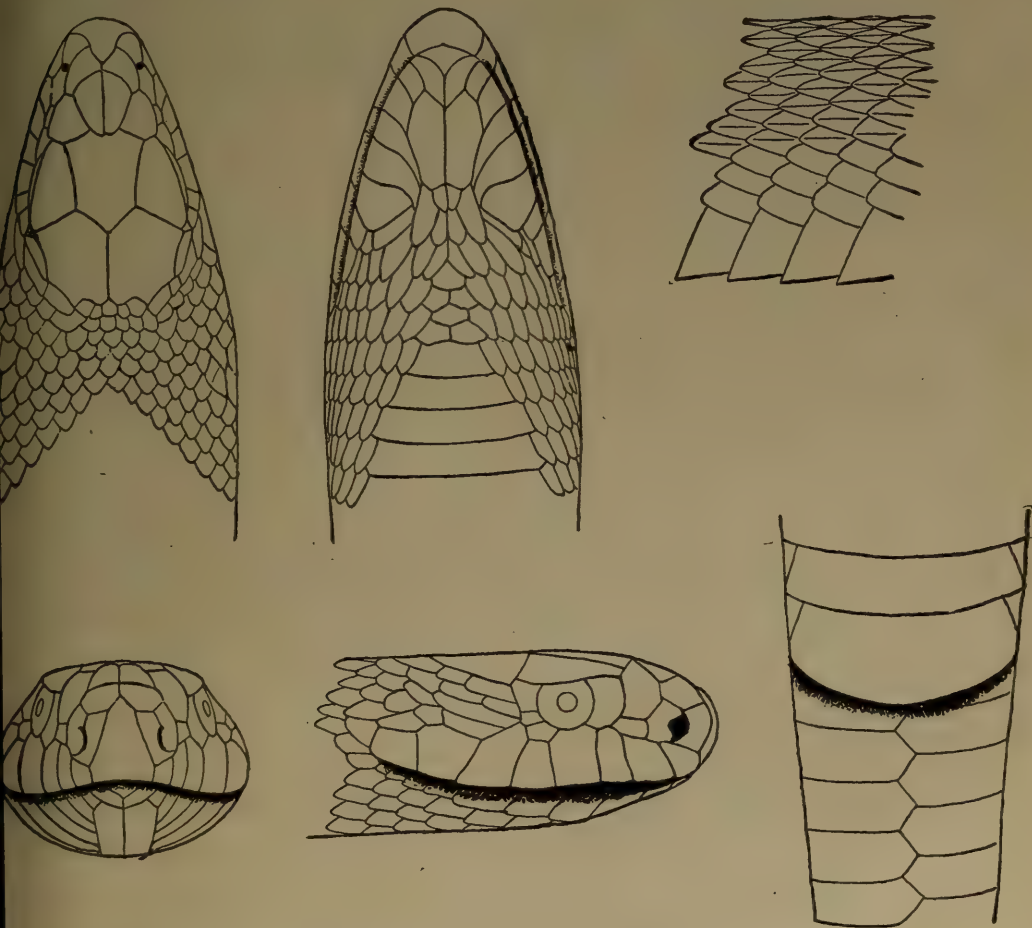
Fig. 9 *Coluber obsoletus obsoletus*

Reed. 1901

"Occurs in Rockland county." *Wallace*. 1901

9 *Pityophis melanoleucus* (Daudin)*Pine snake*De Kay. *Pituophis melanoleucus*Jordan. *Pituophis melanoleucus*

Head short, elevated; rostral plate compressed and narrowed above. Scales in 27 to 31 rows, all save the outer four rows on each side being keeled.

Fig. 10 *Pityophis melanoleucus*

Head spotted with black; color above whitish, with a series of chestnut brown blotches, margined with black; abdomen yellowish. Length 60 inches.

"I have seen but one of these snakes in Rockland county (on Tallman's mountain, near Nyack, at an elevation of about 500 feet A.T.), but it is said to be quite common in the county." Wallace. 1901

Mr Wallace's record is of great interest inasmuch as it verifies,

after the lapse of almost sixty years, De Kay's prediction that the species "will probably be found in this state." The pine snake may reasonably be expected to occur in Orange county also, but I have no record of it from that area.

10 *Osceola doliata* (Linn.)

Jordan. *Lampropeltis doliatus*

Scales in 21 rows: head flattish. Ground color above varying from ashen to bright yellow, but only appearing as transverse interspaces between the brown to reddish spots or saddles which cross the back. Length 30-50 inches.

Osceola doliata is one of our most variable species. The subject can not well be discussed in the present bulletin, and the reader is referred to Prof. Cope's papers, the more important of which are cited in the accompanying reference list, for a full presentation of his views. The subspecies next described—the familiar milk snake—is the only form of *Osceola doliata* occurring in New York. Several specimens in the state museum, however, taken near Albany N. Y. agree much more closely with Cope's *O. d. clerica* than with *O. d. triangula*. As Albany is well on toward the northern limit of *Osceola doliata* the significance of this variation in its bearing on Cope's views of the geographic distribution of the various "subspecies" is apparent. Specimens of the "milk snake" from any part of the state would on this account be particularly acceptable to the author.

10a *Osceola doliata triangula* (Boie)

Milk snake

De Kay. *Coluber eximius*

Jordan. *Lampropeltis doliatus triangulus*

Above yellowish gray, with a dorsal series of large brown to chocolate blotches, bordered with black. On each side, on the second to fifth rows of scales, is another series of similarly colored but smaller spots, alternating with the dorsal series. Still another series of blotches, entirely black, occur on the edges of the gastrosteges and the three lowest scale rows. On the head the ground color is exposed as a patch, triangular in outline, the apex being directed backward. Below yellowish white, tessellated with black.

"Generally distributed near New York city, but not common."

Ditmars. '96, p. 13

"A very uncommon species" (in the Highlands.) *Mearns.* '98, p. 327

"A rather common snake in Orange county; less abundant, I believe, east of the Hudson." *Eckel.* 1901, p. 152



Fig. 11 *Osceola dolia triangularis*

"Apparently not common in the immediate vicinity of Ithaca. Farther away from the town they appear to be more common." *Reed.* 1901

"Common in the villages and farming country of Rockland county." *Wallace.* 1901

11 *Ophibolus getulus* (Linn.)

Jordan. Lampropeltis getulus

Head little distinct, conic, not depressed, the muzzle slightly compressed and the rostral plate projecting beyond the lower jaw. Tail short. Scales smooth, in 21 to 25 rows.

Ground color black, marked above and below with yellow or white spots or bands. Top of head black, with white or yellow spots.

Several subspecies exist, the only form occurring within our limits, however, being that next described—*Ophibolus getulus getulus*.

11a *Ophibolus getulus getulus* (Linn.)

Chain snake

De Kay. Coluber getulus

Jordan. Lampropeltis getulus

Scales smooth, in 21–23 rows.

Head black, with yellow spots; color above black, crossed by about 30 narrow, continuous yellow lines, which bifurcate on the flanks; below, yellow, blotched with black. Length 50 inches.

"Not uncommon in the pine woods of New Jersey, and also found, but rarely, in what are called the brush plains of Long Island."

De Kay. '42, p. 38

Hough, ('52, p. 23) in describing his collection made for the state museum in St Lawrence county, notes that this species is "of common occurrence in this section of the state." The specimens then sent in have disappeared, so that the record can not be verified; but, as I have stated, (1901) Gebhard, then curator, was competent to make the specific determination and would hardly have allowed an obvious error to be published. The species can not well be confused with any other New York form, and Hough's record can not

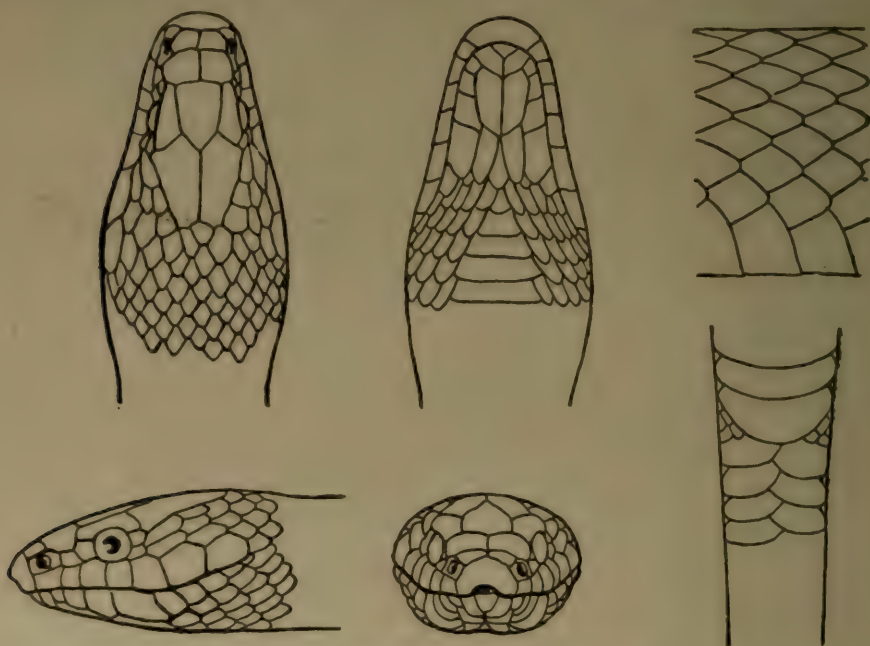


Fig. 12 *Ophibolus getulus getulus* . .

be neglected or suppressed; but, if true, the distribution thus given the chain snake is remarkable. Further data on this point would be of great service, and I would consider it a favor if some St Lawrence county naturalist would investigate the matter.

12 *Natrix fasciata* (Linn.)

Jordan. *Natrix sipedon*

Scales all carinated, in 23 or 25 rows. General form robust; tail not long. General color above bright reddish brown to gray, usually marked by large, dark brown, transverse spots; below yellowish or reddish, usually with more or less rounded spots of chestnut or reddish brown. Length 30-50 inches.

Of the "subspecies" listed by Cope, only one (*N. f. sipedon*) is definitely known to occur within our limits. Both W. H. Smith

('82) and Morse (1901), however, have reported *Natrix fasciata erythrogaster* from Ohio. The latter states that it is the most common form in certain localities on Lake Erie. The value of the identification is problematic, but as the localities are definitely given, and the specimens are now in the zoologic museum of Ohio state university, it would seem that the question could be conveniently and finally settled by submitting a suite to Dr Stejneger. The importance of these Ohio specimens in the present connection is that, if the subspecies is found as described by the authors noted, it may be expected to occur in western New York. The subspecies is marked off from all others of the *Natrix fasciata* by being unspotted both above and below, the coloration above being uniform reddish black, and below yellowish red.

12a *Natrix fasciata sipedon* (Linn.)

Water snake

De Kay. *Tropidonotus sipedon*

Jordan. *Natrix sipedon*

General color dull brown to dark gray, with darker transverse spots; below yellowish, with cloudy blotches of brownish or reddish. Length 30-50 inches. General form robust.

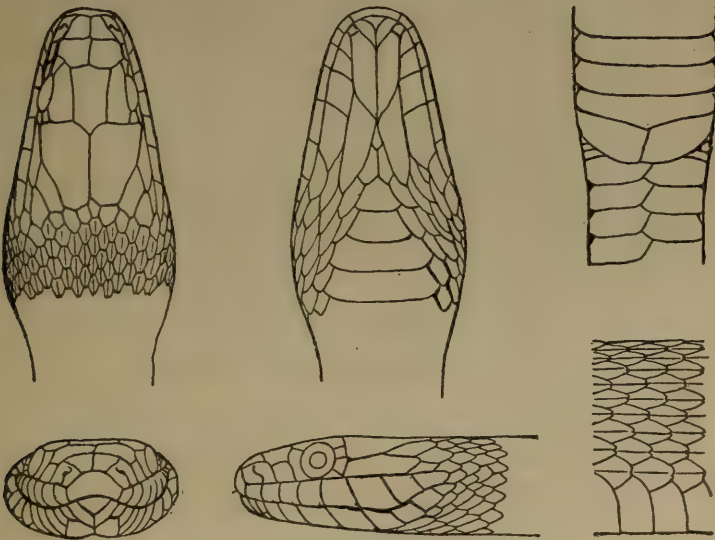


Fig. 13 *Natrix fasciata sipedon*

New York and New England specimens seem, in general, to be darker in coloration than those from more southerly areas. Holbrook's type of *Tropidonotus niger* came from New England

where, he says, the "species" was common. The water snake appears to be common throughout the state in ponds and streams, though rarely found away from their immediate vicinity. It is a particularly bad tempered species, but its bite is, of course, perfectly harmless. In its coloration and general form it bears some resemblance to the poisonous "moccasin" (*Ancistrodon piscivorus*) of the southern states, with which it is frequently confused. Its resemblance to the copperhead (*Ancistrodon contortrix*) (p. 385) is much less close.

"One of our largest, handsomest and most abundant snakes." *Mearns*. '98, p. 326

"Abundant in all the counties of southeastern New York." *Eckel*. 1901, p. 152

"Abundant near Ithaca; common at Hornellsville." *Reed*. 1901

"Often seen along the banks of the Hackensack and other streams in Rockland county, but not so common as the black snake." *Wallace*. 1901

13 *Natrix rigida* (Say)

Stiff snake

De Kay. *Tropidonotus rigidus*

Jordan. *Regina rigida*

Scales carinated, in 19 rows. Muzzle short. Upper surface of head flat. Above greenish brown, with two deep brown dorsal stripes; abdomen reddish yellow, with two series of deep brown to black spots. Length 24 inches.

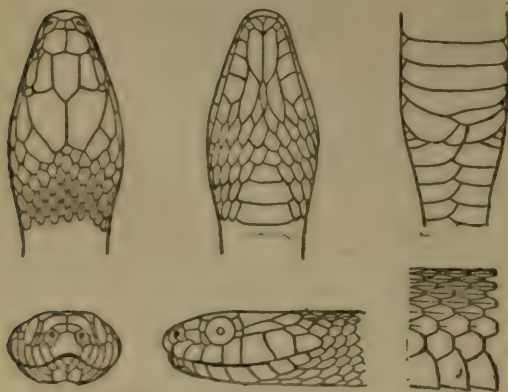


Fig. 14 *Natrix rigida*

Cope (1900, p. 959) mentions that this species ranges north to Pennsylvania.

14 *Natrix leberis* (Linn.)

Leather snake

De Kay. *Tropidonotus leberis*

Jordan. *Regina leberis*

Head small; little distinct from body; depressed and flattened. Scales carinated, in 19 rows.

Above chestnut brown, with a lateral yellow band, and three narrow black dorsal stripes; abdomen yellowish, with four brown longitudinal bands. Length 24 inches.

From description only, this species might possibly be confused with *Eutaenia saurita*, which is also striped longitudinally, though with differently arranged colors. Both species are highly aquatic in habit.

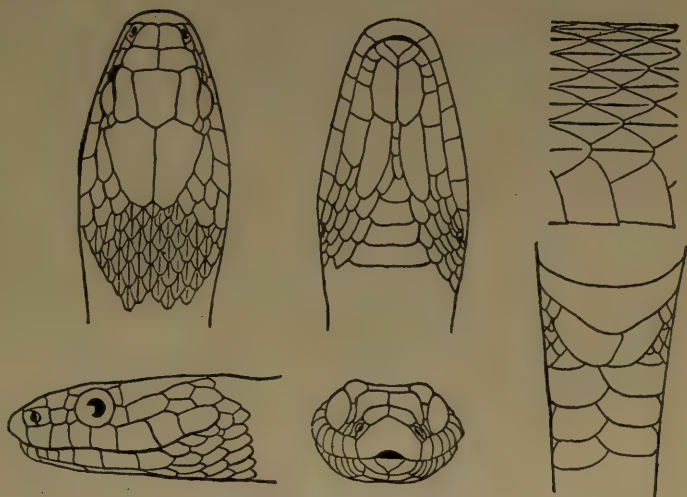


Fig. 15 *Natrix leberis*

Natrix leberis, though included in many faunal lists, seems to be scarce throughout our region, as nearly every observer states that he has never met it, himself, but includes it on good authority.

Cope (1900, p. 995) notes a specimen (no. 10,729) in the U. S. national museum from Livingston county, N. Y.

15 *Natrix kirtlandii* (Kennicott)

Kirtland's snake

Jordan. *Clonophis kirtlandi*

Head very small; not distinct from body. Scales very strongly keeled, in 19 rows.

Above, light reddish to purplish brown, with four rows of large darker blotches on back and sides; beneath, pale brick red, with black spots. Length 16 inches.

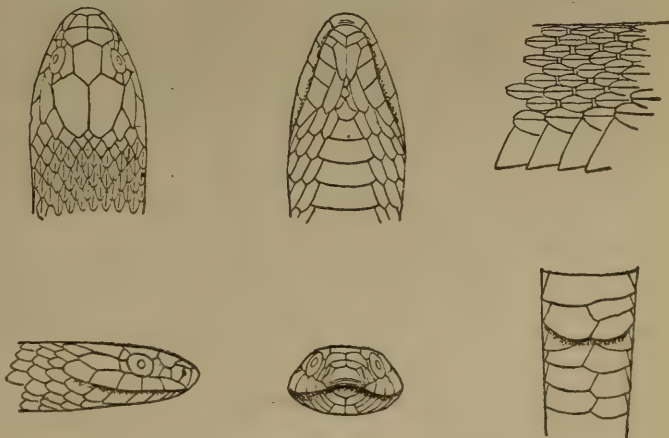


Fig. 16 *Natrix kirtlandii*

Recorded by Abbott ('68) from New Jersey, but the identification apparently doubted by Nelson ('90). Cope (1900, p. 997) restricts its range to Wisconsin, Michigan, Illinois, Indiana and Ohio.

16 *Storeria dekayi* (Holbrook)*De Kay's brown snake*De Kay. *Tropidonotus dekayi*Jordan. *Storeria dekayi*

Head distinct from body. Scales keeled, in 17 rows. One preocular.

Fig. 17 *Storeria dekayi*

Color above, grayish brown to chestnut brown; with a rather faint dorsal band of lighter brown, margined by dark brown or black dots; below, grayish white. Length 12 inches.

Distinguished from *Carphophiops amoenus* and *Storeria occipitomaculata* by its gray (instead of reddish) coloration below; and farther from *C. amoenus* by the distinctness of its head.

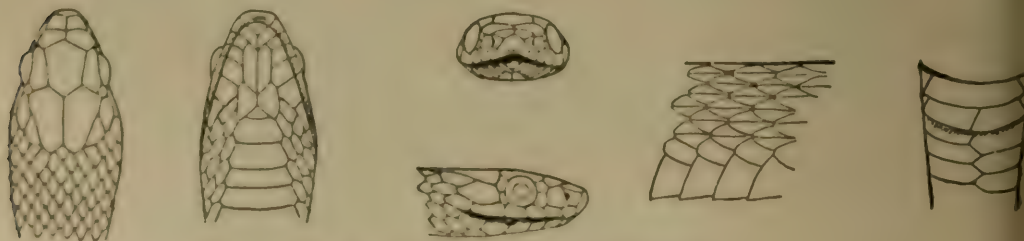
"Quite common in rocky portions of Central park." *Ditmars*. '96, p. 21

"Abundant in southeastern New York." *Eckel*. 1901, p. 153

"Occurring, but not common, in Rockland county." *Wallace*. 1901

17 *Storeria occipitomaculata* (Storer)*Brown snake*Jordan. *Storeria occipitomaculata*

Head distinct from body. Scales keeled, in 15 rows. Two ante-oculars.

Fig. 18 *Storeria occipitomaculata*

Above, grayish brown to chestnut brown, sometimes with a paler dorsal band; three light colored spots behind head; beneath, salmon pink. Length 15 inches.

"Extralimital; Massachusetts." *De Kay*, p. 41

"Common under stones and leaves." *Mearns*. '98, p. 327

"Common in the Schoharie valley; most often seen after sun-down." *Mearns*. '99, p. 345

"Abundant in southeastern New York." *Eckel*. 1901, p. 153

"Fairly common near Ithaca." *Reed*. 1901

"Common in the farming country, but seldom seen in the hills, of Rockland county." *Wallace*. 1901

18 *Eutaenia saurita* (Linn.)

Ribbon snake

De Kay. *Leptophis saurita*

Jordan. *Thamnophis sauritus*

Form elongate; slender; scales strongly keeled, in 19 rows; tail one third (or more) of total length of body.

Color light brown, with three light yellow stripes which are often margined with black; abdomen greenish white. Length 36 inches.

The lateral stripe is

on the third and fourth rows of scales, while in *Eutaenia sirtalis* it occupies the second and third rows.

"Common, especially in fields and meadows through which streams flow and where mice are abundant." *Mearns*. '98, p. 327

"In Westchester and Putnam counties this species appears to be even more abundant than *Eutaenia sirtalis*." *Eckel*. 1901, p. 154

"Common near Ithaca." *Reed*. 1901

"Frequently found in Rockland county." *Wallace*. 1901

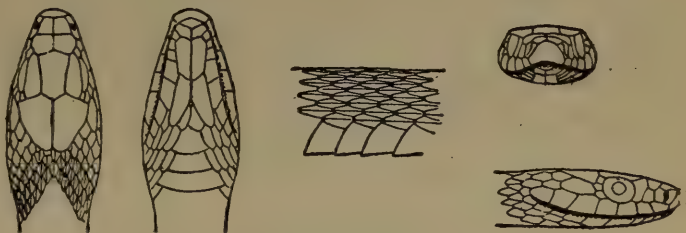


Fig. 19 *Eutaenia saurita*

19 *Eutaenia brachystoma* (Cope)

Head not distinct from neck; superior labials six; inferior labials eight. Scales keeled, in 19 rows. Two distinct nasal plates. Tail one fourth total length.

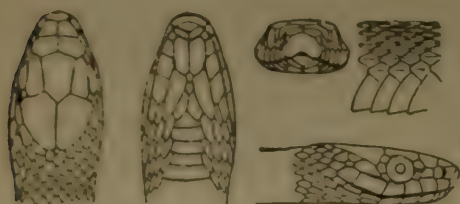


Fig. 20 *Eutaenia brachystoma*

Color below, light olive, unspotted; above darker olive, with a broad, brown band on each side, extending from the fourth to the middle of the ninth row of scales, inclusive; chin yellowish.

The type specimen, and the only one so far obtained, is stated by Cope (1900, p. 1057) to have come from Franklin, Venango co. Pa.

20 *Eutaenia sirtalis* (Linn.)

Garter snake

De Kay. *Tropidonotus taenia*

Jordan. *Thamnophis sirtalis*

Head distinct, oval; body moderately robust; form in general much stouter than *Eutaenia saurita*; tail between one quarter and one fifth of total length. Superior labials eight; inferior labials 10; scales keeled, in 19 rows. Color above varying from light green through olivaceous to black, usually traversed by three longitudinal stripes, of which the laterals are not well defined, and all three may be very faint or entirely wanting. Below, usually light bluish green, but varying to darker and even to black.

This, the common "garter snake," is abundant throughout the state, and ranges in altitude from tide level to the highest summits of the Catskills and Adirondacks. It is the most variable of American serpents, no less than six "subspecies" having been recorded from the area here considered. In the author's opinion, however, these six forms are of very unequal systematic value, and calling all of them subspecies merely results in rendering that term meaningless. At some future time the author hopes to be in a position to discuss the New York forms, at least, in more detail; but at present this is impossible, owing to lack of the large series of fresh specimens which such an investigation would require. This being the case, the six "subspecies" noted have been listed and described on the following pages, but the reader may expect to find

specimens of *Eutaenia sirtalis* agreeing with several of the subspecific descriptions, or differing from all of them.

20a *Eutaenia sirtalis graminea* (Cope)

Green garter snake

Above, light green, with no stripes or spots on upper side of body or head; below yellow, clouded with green. Lips, chin and throat uniform yellow.

Cope (1900, p. 1067) lists specimens from Ohio, Massachusetts and Maine. I have never seen a New York specimen of *Eutaenia sirtalis* approaching the coloration of this form.

20b *Eutaenia sirtalis ordinata* (Linn.)

Spotted garter snake

Jordan. *Thamnophis sirtalis ordinatus*

General color greenish brown or olive; stripes faint; three series of small square dark blotches on each side; beneath, greenish white, with spots of black near each end of the gastrosteges; upper labial plates all edged prominently with black.

I have found this "subspecies" at Vernon, Oneida co., Peekskill, Westchester co., Central Valley, Orange co. A specimen is in the museum collection, taken by Dr M. S. Farr at Kenwood, Albany co., and another, less typical, taken by Dr Tarleton Bean at Patchogue, Long Island. Ditmars ('96, p. 20) mentions specimens taken on Long Island, and at Fort Lee N. J.; while Wallace (1901) notes the occurrence of the subspecies in Rockland county.

20c *Eutaenia sirtalis sirtalis* (Linn.)

Striped garter snake

Color above the yellowish lateral stripes dark olive to dark brown; a narrow, rather indistinct greenish yellow vertebral line; three

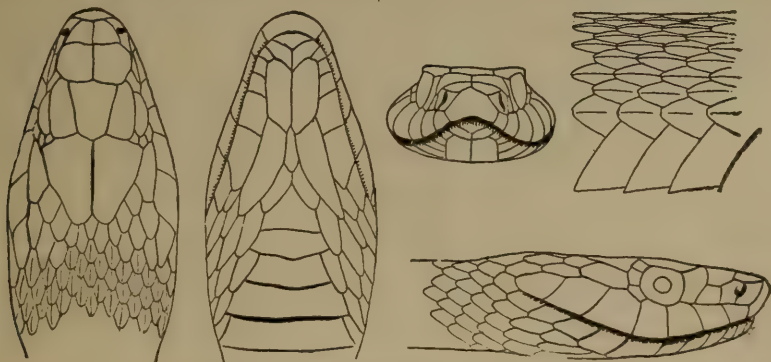


Fig. 21 *Eutaenia sirtalis sirtalis*

series of small indistinct spots on each side; below, greenish white; black blotches on gastrosteges near outer margins.

Common everywhere throughout the state, though possibly many specimens identified as belonging to this subspecies may have been really one of the three following.

20d **Eutaenia sirtalis obscura** (Cope)

Dusky garter snake

Jordan. *Thamnophis sirtalis obscurus*

A yellowish dorsal band, with lateral bands less distinct; ground color, exposed between these bands, is uniformly brownish, caused by the complete fusion of the spots shown on other subspecies; below, grayish green, with black spots near ends of gastrosteges.

Specimens noted by Cope (1900) from Westport, Essex co.

20e **Eutaenia sirtalis dorsalis** B. & G.

Red garter snake

Jordan. *Thamnophis sirtalis dorsalis*

Ground color brownish; lateral stripes olivaceous; dorsal stripe bright red; lateral spots separated by red interspaces.

From descriptions given in many of the faunal lists published for the region under consideration, I am led to believe that many specimens from New England and northern New York are to be classed with the "dorsalis" group, and I have therefore inserted a description of its typical subspecies.

20f **Eutaenia sirtalis pallidula** (Allen)

General color above, olive to olive brown; dorsal stripe, except at its inception, almost obsolete; the interlinear spots of reddish scales with narrow black edgings and black interspaces. Belly, in young specimens grayish white, in adults from grayish white to light yellowish.

The above description is quoted from Allen ('99) where the subspecies is first described, a paper to which readers are referred for a more detailed description. In this paper Mr Allen gives its distribution as "from the White mountains of New Hampshire and the Adirondacks of New York, northward into New Brunswick and Nova Scotia, and possibly farther;" while in a later communication to the author he instances a specimen of this subspecies caught at Chateaugay, Franklin co. N. Y.

The author has not seen the specimens on which this subspecies is based, but from the published description the form seems to be entitled to as much recognition as *E. s. graminea*, and certain other forms to which Cope has given subspecific rank.

B. CROTALIDAE

Deep pit between eye and nostril; head rather markedly triangular; neck constricted; subcaudals entire. No normal (solid) teeth upon the upper jaw, which carries erectile hollow poison fangs. All the species are venomous.

21 *Ancistrodon contortrix* (Linn.)

Copperhead

De Kay. *Trigonocephalus contortrix*

Jordan. *Agkistrodon contortrix*

No rattle. Top of head with nine symmetric plates in front; scales behind. Scales in 23 rows. General form robust.

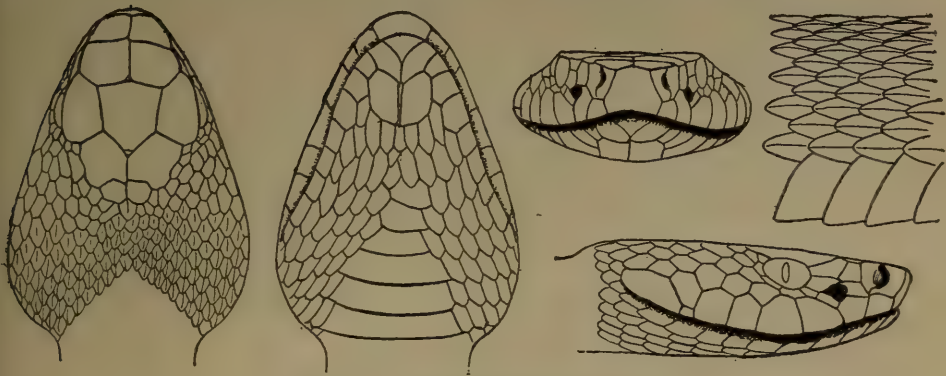


Fig. 22 *Ancistrodon contortrix*

Above hazel brown, becoming bright copper colored on head; darker chestnut colored blotches on sides; beneath dull yellowish, with a series of distinct, large, dark blotches on each side. Chin and throat unspotted. Sides of head cream color. Length 40 inches.

"Though found in the western part of the state, most numerous in the meadows of Columbia and Dutchess counties." *De Kay*, '42

Ditmars ('96, p. 23) mentions occurrences at Alpine N. J., and in Putnam, Westchester and Dutchess counties, N. Y.

"Much more common than the 'rattler.' Some are killed in hay-fields in the neighborhood of Highland Falls, Orange co. each year."

Mearns. '98, p. 327

"Occurs in swamps and low grounds in Orange and Dutchess counties, but scarcer in the Highlands." *Eckel*. 1901, p. 154

"Very common in Rockland county." *Wallace*. 1901

The milk snake (p. 374); the water snake (p. 377) and the blowing adder (p. 368) are frequently confounded with this species, though bearing only a very superficial resemblance to it.

22 *Sistrurus catenatus catenatus* (Rafinesque)

Massasauga

Gebhard. '53, p. 22. *Crotalophorus tergeminus*

Jordan. *Sistrurus catenatus*

Tail with a rattle. Head with nine symmetric plates in front; covered with scales behind. Scales in 25 rows. Urosteges undivided, except the last three to five, which are bifid.

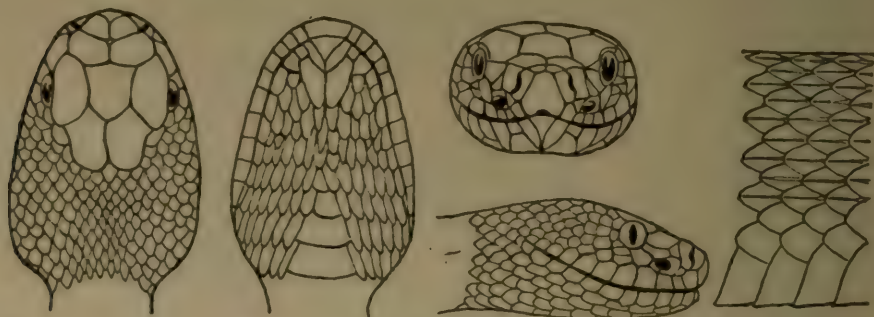


Fig. 23 *Sistrurus catenatus catenatus*

Ground color above, brown; blotches deep brown to blackish, with yellowish white margin; color beneath, blackish brown, intermingled with yellowish. Length 24–30 inches.

The rattles of this species are much smaller than those of a banded rattlesnake of equal length; and their sound is correspondingly feeble.

Described by De Kay ('42, p. 57) as extralimital, this species was added to the New York faunal list by Gebhard ('53, p. 22), a specimen having been sent in by the Hon. Levi Fish, from the town of Byron, Genesee co. Gebhard states further that in this town "their habitat is a white cedar swamp, containing an area of about one thousand acres. During the summer season, they leave the swamp, and go into the adjoining fields of grain, where they remain until fall, when they return to the swamp and hibernate." No later record exists of their occurrence in New York state; and

the species has never been noted from any of the other states falling within the scope of this paper. It occurs, however, in Ohio (W. H. Smith, '82, p. 672), from which state it is also listed by Cope (1900, p. 1149) and Morse (1901).

It seems highly probable that many of the western New York localities given by Macauley ('29) for the rattlesnake may, in reality, refer to this species.

23 *Crotalus horridus* Linnr.

Banded rattlesnake

De Kay. *Crotalus durissus*

Jordan. *Crotalus horridus*

Tail with a rattle. Top of head covered entirely with scales. Scales in 29 rows.

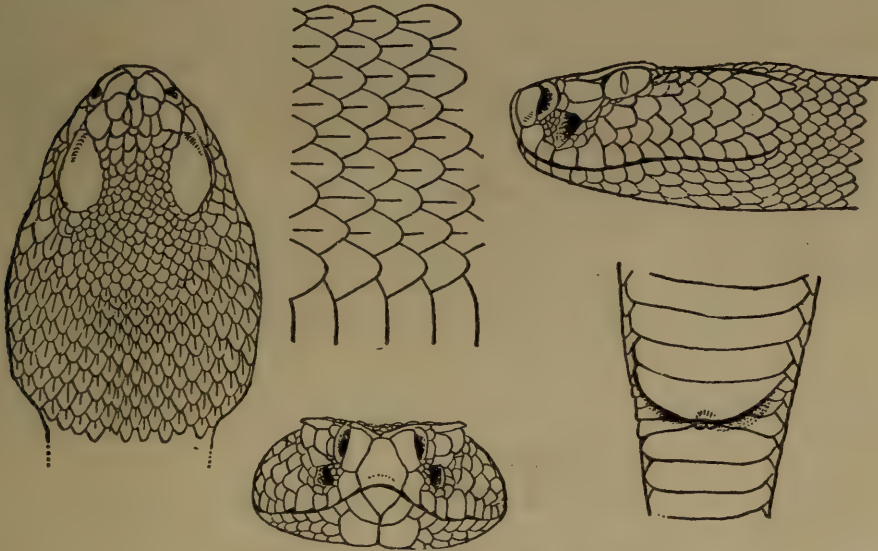


Fig. 24 *Crotalus horridus*

Color above, bright yellowish to dark brown; two series of dark brown to black spots on each side of median line, often confluent across back; tail black; below, yellowish white to gray. Length 60 inches.

Macauley ('29, p. 514) gives an interesting and detailed account of the distribution, at that date, of the rattlesnake.

"They are found on Long Island and Manhattan Island; in some parts of the Highlands; around the head of Lake Champlain; at and around Lake George; at Glenville, in the county of Schenectady; at the Noses, in the county of Montgomery; along some parts

of Unadilla and Susquehanna rivers; at Lenox and Sullivan, in the county of Madison; at Manlius and Onondaga, in Onondaga county; in some parts of the county of Ontario; along Genesee and Niagara rivers; and in many places in the Oak lands, between those rivers, and also east of the former; at several places along the Schoharie creek; at the Helderberg, in the county of Albany; at Snake hill, near Newburg; and in some other places."

De Kay ('42), says of the species:

"It is common in various parts of the state, and in the northern states generally appears to prefer rocky situations. They abound in Clinton, Essex and Warren counties, along the shores of Lakes Champlain and George. Although numerous in the rocky mountainous districts of this state, they are rare or entirely wanting in those elevated regions which give rise to the Moose, the Racquette and the Hudson rivers. They are found in the counties of Sullivan, Ulster, Orange and Greene. A few still linger in the swamps of Suffolk county."

"Becoming quite rare within 50 miles of New York city, the nearest locality in which it has been found in the past few years being Putnam county, N. Y.; it also occurs in Connecticut, and Prof. E. B. Southwick tells me that a few are found annually in the central part of Long Island." *Ditmars*. '96, p. 24

"Formerly numerous about Highland Falls; now extremely rare." *Mearns*. '98, p. 327

"Still occurs in Orange and Rockland counties, but very rare and possibly extinct east of the Hudson in this state. Cope notes a specimen collected in 1878 at Katonah, Westchester co.; and I have been informed that one was killed in 1887 near White Plains N. Y." *Eckel*. 1901, p. 155

"Still met with in Rockland county." *Wallace*. 1901

Rattlesnakes are occasionally reported from the western counties of this state. It is possible that some of these accounts may refer to the massasauga (p. 386) whose present distribution in the state is unknown.

LIZARDS, TORTOISES AND BATRACHIANS OF
NEW YORK

BY F. C. PAULMIER PH. D.

INTRODUCTION

The following catalogue describes the lizards, tortoises and batrachians which occur in New York or which from their occurrence in adjoining states may be expected to be found here. Since the appearance of Holbrook's and DeKay's work, no papers dealing with these forms as a whole, have appeared, except those of Sherwood and Smith which catalogue the species found near New York city. Thus practically nothing is known of the forms found in the northern and western part of the state and collections made there would be of great value in studying the distribution of the groups.

The main works on the lizards, tortoises and batrachians are included in the following bibliography. Other references will be found in the list on p. 357, where such works are marked with an asterisk. The descriptions are taken mainly from the papers by Cope and Jordan.

- Cope, E. D.** '89. The batrachia of North America. U. S. nat. mus. Bul. 34. 1889.
—— '98. Crocodilians, lizards and snakes of North America. U. S. nat. mus. Rep't. 1898.
Jordan, D. S. '99. A manual of the vertebrate animals of the northern United States. Ed. 8. 1899.
DeKay, J. E. '42. Natural history of New York. Zoology of New York. v. 3. Reptiles and amphibia. 3, text; 4, plates. 1842.
Holbrook, J. E. '42. North American herpetology. 1842.
Sherwood, W. L. '94. Salamanders found in the vicinity of New York city, with notes on extralimital or allied species. Linn. soc. of N. Y. Abst. proc. 1894-95. No. 7.
—— '97. Frogs and toads found in the vicinity of New York city. Ibid. 1897-98. No. 10.
Smith, Eugene. '98. Turtles and lizards of the vicinity of New York city. Ibid. 1898-99. No. 11.

A. LACERTILIA

Lizards

Long-tailed reptiles, covered with scales; usually with four limbs terminating in claws. The young undergo no metamorphosis, being hatched from the egg in a form resembling the parent. Lizards prefer warm climates and but three species are found within our limits, two being fairly common, while the other is recorded only once from this state.

1 *Sceloporus undulatus* Latreille

Common lizard, swift, fence lizard, pine lizard

De Kay¹. *Tropidolepis undulatus*, the brown swift, p. 31, pl. 8, fig. 16

Brownish olive or gray, with black, wavy, V shaped bands on each side; throat and sides of belly in male, blue with a black edging. Length 7 inches.

Its eggs, which are long and narrow, are laid in the sand about June 1 and hatched about July 10.

Found in southern part of the state. Very rapid in its movements, and frequently found under bark of decayed trees. It chooses old fences as its basking places.

2 *Eumeces quinquelineatus* Linn.

Blue-tailed lizard

De Kay. *Scincus fasciatus*, blue-tailed lizard, "scorpion," p. 29, pl. 8, fig. 17

Color variable, but usually olive with five yellowish streaks, the middle one forking on the head; tail bright blue. Old specimens become reddish and stripes grow fainter and may disappear. Length 8-11 inches.

Found in the southern part of the state; lives on the ground; is very active; it readily parts with a portion of its tail when an attempt is made to capture it.

3 *Liolepisma laterale* Say

Ground lizard

Upper parts of head and body reddish olive; on each side a black stripe; the sides below this lateral band striped alternately dusky

¹ References to De Kay under the different species refer to the *Zoology of New York, Reptiles and amphibia*, v. 3, text; v. 4, plates, by James E. De Kay, 1842.

and lighter; abdomen yellowish; tail pale bluish or greenish below. Length 5 inches.

Usually considered a southern form; but Cope notes a specimen taken in Burlington county, N. J.; and H. D. Reed informs me that a specimen in the collection of Cornell university was captured Ap. 23, 1892, on the Caroline hills, southeast of Utica N. Y. by W. J. Terry.

B. CHELONIA

Turtles

The turtles and tortoises, which comprise the order Chelonia, may be defined as reptiles having the skeleton mainly external. The body is inclosed in a shell of bony plates consisting of a dorsal carapace (to which the vertebrae and ribs are firmly fused) and a ventral plate or plastron. Both of these are covered over with horny plates which are composed of the well known tortoise shell.¹

The vertebrae of the neck and tail are free and movable. The limbs are well developed and usually terminated by claws. In some forms there is a web between the toes, while in the marine forms (not included in this list) the feet have the form of flippers. Teeth are never developed, the jaws being covered by a layer of horn.

Their eggs, which have a tough leathery shell, are laid in the dry sand and are hatched by the heat of the sun. Like all reptiles, the young leave the egg in the form of the parent, and thus do not undergo any metamorphosis, as do the batrachians. They breathe by lungs throughout their entire existence.

The Chelonia are found both on land and in water, many forms being apparently equally at home in either.

Omitting the marine turtles, our forms represent four families.

- 1 Trionychidae, soft-shelled turtles
- 2 Chelydridae, snapping turtles
- 3 Kinosternidae, box or musk turtles
- 4 Emydidae, pond turtles

Family 1 **TRIONYCHIDAE**

Soft-shelled turtles

Body flat, round; carapace not completely ossified, and with the

¹ The tortoise shell of commerce is derived from one of the marine forms.

plastron covered by a thick leathery skin, flexible at the margins; neck long and flexible, snout pointed and tubular; feet webbed. Aquatic, carnivorous and very voracious.

1 **Amyda mutica** Le Sueur

Leather turtle

A depression along median line of carapace, no spines or tubercles; olive to brown, young spotted; feet not mottled below. Length 12 inches.

Probably found in the northern part of the state in Lakes Erie and Ontario and the streams flowing into them.

2 **Aspionectes spinifer** Le Sueur

Soft-shelled turtle

De Kay. *Trionyx ferox*, p. 6, pl. 6, fig. 11

Carapace slate-colored with spots; legs and feet mottled everywhere with dark; anterior part of carapace with tubercles.

Found in Lakes Ontario and Erie, from which they come through the Erie canal to the Hudson; also in southwestern part of state.

Family 2 **CHELYDRIDAE**

Snapping turtles

Represented by one species with the characters of the family.

3 **Chelydra serpentina** L.

Snapping turtle

De Kay. *Chelonura serpentina*, p. 8, pl. 3, fig. 6

Young dusky brown with dark spots; head very large; jaws strong; tail long and strong, with crest of compressed tubercles; plastron small, cross-shaped, leaving the body largely uncovered; toes partially webbed. Length 24 inches.

Found all over the state in quiet waters. Its snapping propensities are well known. In the spring it lays 60 to 70 eggs in the sand, frequently at some distance from the water (De Kay).

Family 3 **KINOSTERNIDAE**

Box turtles

Carapace long and narrow, lightest behind; margins turned downward and inward rather than outward; plastron large; head pointed; limbs slender.

4 Kinosternun pennsylvanicum Bosc*Mud tortoise*

De Kay. *K. pennsylvanicum*, p. 21, pl. 2, fig. 4

Shell dusky brown; head dark, with light dots. Differs from the following species in that the plastron is divided into two parts, so that the animal can shut itself up almost completely. Length 4 inches.

Rare but may be taken in southern part of the state. Frequently found on land.

5 Aramochelys odorata Latreille*Musk turtle, stink pot*

De Kay. *Sternothaerus odoratus*, p. 22, pl. 7, fig. 13

Shell dusky, sometimes spotted, usually covered with mud and green algae; neck with two yellow stripes; plastron cross-shaped, somewhat like *Chelydra* but larger; head large, jaws strong, odor strong musky.

Found in ponds and ditches all over the state. Is a nuisance to fishermen, whose hooks it takes.

Family 4 EMYDIDAE*Pond turtles*

Carapace ovate, broadest behind, the margins having a tendency to flare outward; plastron covering entire ventral surface, its plates 12 in number.

6 Graptemys geographicus Le Sueur*Map turtle*

De Kay. *Emys geographica*, The geographic tortoise, p. 18, pl. 4, fig. 7

Dark olive brown with network of greenish or yellow lines, more prominent on edges of carapace; head and neck also with yellow stripes; plastron yellowish; carapace notched behind and keeled.

Found in streams in western part of state.

7 Graptemys pseudogeographicus Holbrook

De Kay. *Emys pseudogeographicus*, the pseudo-geographic tortoise, p. 19, pl. 2, fig. 3

Much like preceding but browner, the markings on the shell pale and in larger pattern; keel of carapace stronger, back of each plate in the middle line projects over succeeding one; plastron yellowish, marbled with reddish brown; head and legs with bright yellow stripes.

Said by De Kay to have been taken in Lake Erie. A western form.

8 **Malaclemmys centrata** Labr.

Salt marsh turtle, diamond back

De Kay. *Emys palustris*, the salt water terrapin, p. 10, pl. 3, fig. 5

Greenish or dark olive, plates of both shells usually with concentric dark stripes, sometimes grooved. Length 10 inches.

Occasionally found along the coast; the only one of our turtles except the true marine forms, which is found in salt water.

9 **Pseudemys rubriventris** Le Conte

Red-bellied terrapin, slider

De Kay. *Emys rubriventris*, p. 16, pl. 7, fig. 14

Dusky or blackish with irregular red markings, specially on edge of shell; plastron red and yellowish with dark spots; head and neck brown with reddish and yellowish lines.

In streams in the southeastern part of the state. Used as a substitute for the real terrapin.

10 **Pseudemys hieroglyphica** Holbrook

Shell depressed, olive brown, marked with groups of concentric yellowish lines; plastron yellowish; head very small with yellow lines.

A southwestern form, habitat given by Jordan as New York to Wisconsin and south.

11 **Chrysemys picta** Herm.

Painted turtle, mud turtle

De Kay. *Emys picta*, p. 12, pl. 5, fig. 10

Greenish black, plates edged with yellow; the marginal plates marked with bright red; plastron yellow with brown blotches; legs and tail with red lines; upper jaw notched in front. Length 6 to 8 inches.

Very common throughout the state, preferring quiet waters and frequently seen basking in the sun, on logs.

12 **Chrysemys marginata** Agassiz

Colors similar to preceding, but plates of carapace alternating; the lateral rows out of line with the middle one, instead of forming three sets of three as in above; lateral plates with strong concentric grooves. Possibly a form of the preceding.

Found in the western part of the state.

13 Chelopus muhlenbergii Schw.*Muhlenberg's tortoise*

De Kay. *Emys muhlenbergii*, Muhlenberg's tortoise, p. 17, pl. 8, fig. 15

Brown with yellowish markings; plastron black with yellowish blotches; an orange spot on each side of the neck; plates of back plain or concentrically grooved. Length $4\frac{1}{2}$ inches.

Southern part of state, particularly in the branches of the Delaware river.

14 Chelopus insculptus Le Conte*Wood tortoise*

De Kay. *Emys insculptus*, wood terrapin, p. 14, pl. 4, fig. 8

Carapace with a keel, its plates marked with concentric striae and radiating black lines; ground color yellowish or reddish brown; plastron with a black blotch on each plate. Length 8 inches.

All over the state, taken both in land and water.

15 Chelopus guttatus Schnei.*Speckled tortoise*

De Kay. *Emys guttata*, the spotted tortoise, p. 13, pl. 16, fig. 12

Black with yellow spots, whose number varies with age, the young having only a single spot on each plate; plastron yellow, blotched with black. Length $4\frac{1}{2}$ inches.

Common in ponds all over the state, frequently seen sitting on logs.

16 Emydoidea blandingii Holbrook*Blanding's tortoise*

De Kay. *Cistudo blandingii*, p. 25, pl. 1, fig. 2

Black with numerous round or oblong yellow spots; plastron with a transverse hinge, as in the common land tortoise, enabling the animal to shut itself up tightly. Young jet black without spots.

Rare but possibly to be taken in this state.

In habits similar to following.

17 Cistudo carolina L.*Box tortoise*

De Kay. *C. carolina*, box turtle, p. 24, pl. 21, fig. 1

Colors highly variable, usually yellowish brown with spots and blotches of yellow; plastron with a hinge, as in preceding. Length 5-7 inches.

Found all over the state in dry places.

BATRACHIA

Batrachians, or amphibians, are vertebrates with soft skins, which possess gills, either during their earlier or larval stages only or throughout life, and which usually breathe by lungs in the adult.

The living representatives of the group are divided into three orders: 1) Proteïda, which retain their gills throughout life, and of which our only representative is the mud puppy, *Necturus*; 2) Urodela, long-tailed forms which lose their gills in the adult stage and include the salamanders and newts;¹ and 3) (Anura) Salientia, tailless forms, without gills in the adult and with hind legs adapted for leaping, and including the frogs and toads.

The adult batrachians are found mostly in moist places, their soft skins generally unfitting them for the hot, dry places which many of the reptiles are so fond of. Thus the greater number of forms are found in or near water (frogs and some salamanders) or under stones and logs in woods (most salamanders). A few, such as the tree frogs are arboreal; others, including some of the salamanders and the wood frog, are found on the ground in dry woods; while the common toad is found everywhere on land.

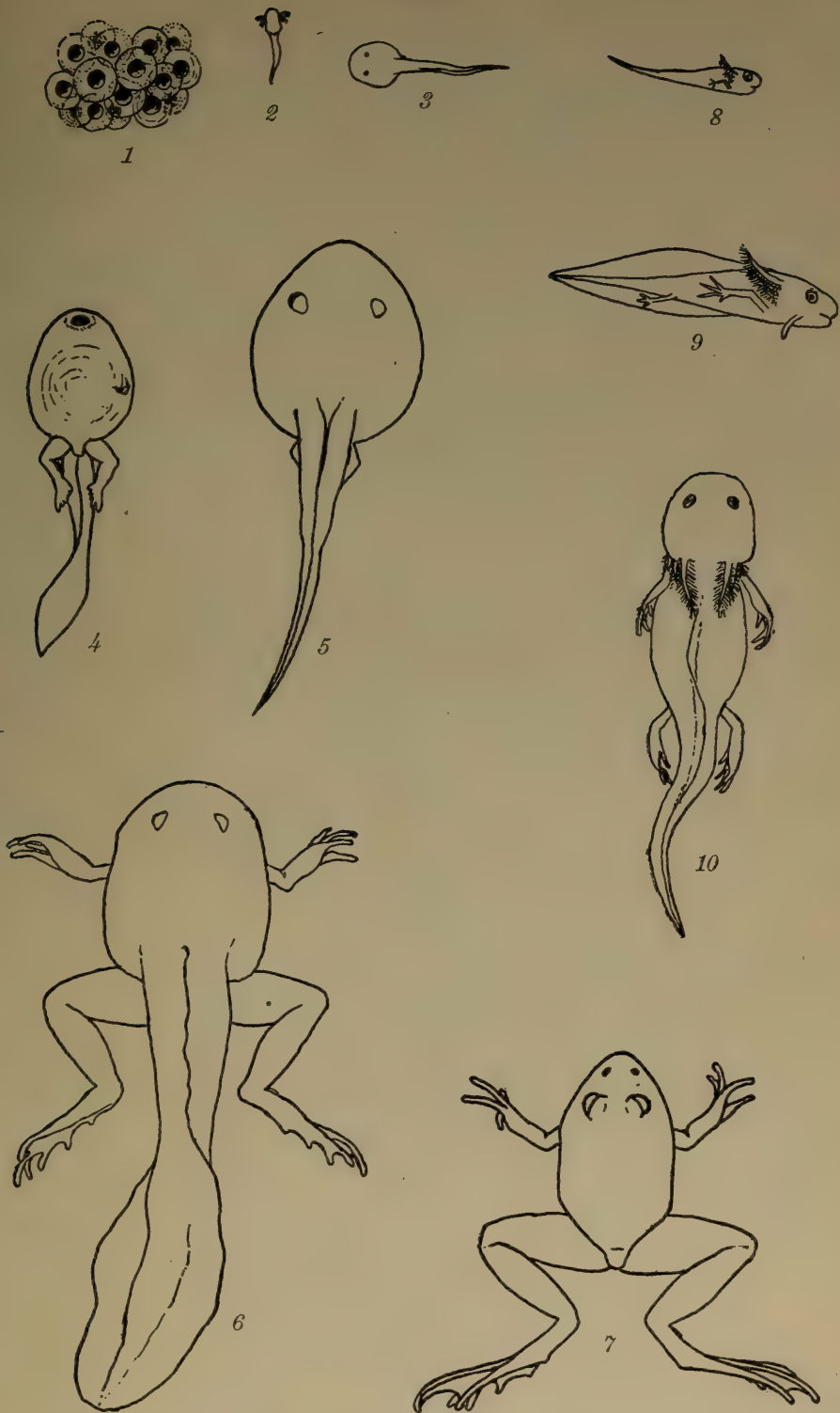
In the spring, however, almost all forms seek the water to breed. Their eggs are the round black bodies contained in the transparent jellylike masses which are so frequently found in ponds. These give rise to the well known limbless tadpoles, or polliwogs, which possess gills and are thus fitted for a subaquatic, fishlike existence. After a shorter or longer period, the limbs appear and lungs develop, while the gills disappear (in most cases), so that the animal becomes an air-breathing, instead of water-breathing form.

The batrachians are all perfectly harmless forms and, with very few exceptions, never even attempt self-defense. For their protection from enemies they rely on their coloration and on their places of concealment.

Their food consists almost entirely of insects, so that they have a distinct economic value.

¹ There is no common American term for these forms, though the word lizard is occasionally employed. This is a misnomer, as the lizards are reptiles, which, while they resemble the batrachians in form, have a scaly skin and never have gills.

Plate 1.



Metamorphoses of Batrachia

Fig. 1-7 Development of frog

Fig. 8-10 Stages in development of salamander

Order 1 PROTEIDA

Large eellike forms, which retain their external gills throughout life. Lungs are developed, but are not normally functional. Only one family.

Family PROTEIDAE

Represented here by one species.

1 *Necturus maculatus* Rafinesque*Mud puppy*

De Kay. *Menobranthus lateralis*, The banded proteus, p. 87, pl. 18, fig. 45.

Much the largest of our batrachians, except the hellbender, reaching a length of 2 feet. Eellike, with feeble legs; light chocolate brown, with darker brown spots. Three pairs of bushy, bright red, external gills.

Common in most of the larger streams and lakes of the northern and western part of the state. Found in the Erie canal. De Kay ('42) stated that it would soon be found in the Hudson river, a prediction since verified, as numerous specimens are now taken around Albany. Information as to how far up and down the river it has reached is greatly to be desired.

Order 2 URODELA

Salamanders

Include all the rest of the long-tailed batrachians. No gills in the adult stage; limbs equally developed. The eggs are usually laid in the water either singly on leaves or in masses like those of the frog. The larvae or tadpoles differ from those of the frogs and toads in that the gills are not covered over, but remain external and do not disappear till a late stage. A pair of processes known as balancers occurs in front of the gills. Three stages in their development are shown in fig. 8-10 of pl. 1.

The following families are represented within our limits.

- 1 Cryptobranchidae
- 2 Amblystomidae
- 3 Plethodontidae
- 4 Desmognathidae
- 5 Pleurodelidae

Family 1 **CRYPTOBRANCHIDAE***Giant salamanders*

Represented by one species with the characters of the family.

2 **Cryptobranchus allegheniensis** Daudin*Hellbender*

De Kay. *Menopoma alleghaniensis*, the Alleghany hellbender, p. 89, pl. 18, fig. 44

A large form, reaching at times, 2 feet. Generally lead-colored, occasionally spotted; head broad and flat; body with a lateral fold of skin. A very unprepossessing but harmless creature. Nothing is known of its breeding habits.

Probably found in the branches of the Alleghany river in the western part of the state. Where it is common, it annoys fishermen by taking their hooks. It is remarkably tenacious of life.

Family 2 **AMBLYSTOMIDAE***Blunt-nosed salamanders*

Except for the two preceding forms the members of this family are the largest and stoutest of our salamanders. They are almost entirely land forms, except in the breeding season, the spring, when they migrate to the ponds to lay their eggs. These are somewhat larger and fewer than frogs eggs, and the jellylike mass surrounding them is whiter and more opaque.

3 **Amblystoma opacum** Gravenhorst

De Kay. *Salamandra fasciata*, the blotched salamander, p. 77, pl. 17, fig. 40

Black above, with about 14 bluish gray bars running across; belly dark blue. 11 costal grooves between legs. Length $3\frac{1}{2}$ inches; very stout.

Southern part of state. This species is found in dryer places than the majority of salamanders, even on bare rocks in the sun (Mearns) and in sandy places (Cope).

4 *Amblystoma punctatum* Linn.

Spotted salamander

De Kay. *Salamandra subviolacea*, large spotted salamander, crimson spotted triton, p. 74, pl. 16, fig. 36

Black above, with a series of round yellow spots on each side of the back; body broad, depressed, and swollen; tail not as long as rest of body. 11 costal grooves on each side. Length $6\frac{1}{2}$ inches.

Probably generally distributed over the state. Found under rocks and decaying trees, and occasionally wanders into cellars.

5 *Amblystoma conspersum* Cope

Smaller spotted salamander

Lead-colored, with one or two series of small yellowish spots along sides; skin smooth; body more slender than the preceding; tail shorter than head and body. 11 costal grooves. Length about 4 inches.

Taken in Pennsylvania, and may be found in southern part of this state.

6 *Amblystoma tigrinum* Green

De Kay. *Triton tigrinus*, tiger salamander, or triton, p. 83, pl. 15, fig. 32

Dark brown, with usually, many irregular yellow blotches, sometimes arranged in cross bands; body thick and strong; head long; tail about equal in length to body. 12 costal grooves. Length 8–10 inches. The largest of our salamanders and very variable.

All over the state. Said by De Kay to be found in decayed, hollow trees, but usually in burrows and under stones.

7 *Amblystoma jeffersonianum* Green

De Kay. *Salamandra granulata*, the granulated salamander, p. 78, pl. 23, fig. 66; *Triton niger*, the dusky triton, p. 85, pl. 15, fig. 35

Olive-brown or blackish, usually with bluish spots, but sometimes uniformly lead-colored; head small; eyes far back; body slender. 12 costal furrows. Length 5–8 inches.

Two varieties, possibly throughout the state. According to De Kay, inhabiting wet, springy places.

The three following families of Urodela, while possessing well marked osteologic differences, show no external characters sufficiently obvious to distinguish them easily. For this reason no description has been attempted.

Family 3 PLETHODONTIDAE

8 *Hemidactylium scutatum* Schlegel*Four-toed salamander*

Brown above; snout yellow; whitish below with dots like ink spots; skin finely granulated, resembling scales. Somewhat resembles *Plethodon cinereus*, but has only four toes on each foot. 14 costal furrows. Length $2\frac{1}{2}$ inches.

Probably to be found in this state.

"Under logs and rails in open woods at some distance from water." *W. H. Smith. '82*

9 *Plethodon cinereus* Green

De Kay. *Salamandra erythronota*, the red-backed salamander, p. 75, pl. 16, fig. 38

Three subspecies of this form are distinguished by Cope.

a *Plethodon cinereus cinereus*, color, liver-brown, below dirty white mottled with black, giving a "pepper and salt" appearance, sometimes yellowish toward the head. 18 costal grooves.

b *P. c. erythronotus*. Form and structure similar to above but back with a broad, reddish stripe. 18 costal grooves. Resembles *Spelerpes bilineatus*, but in that form the belly is unspotted and there are fewer costal furrows.

c *P. c. dorsalis*. Quite similar to *c. erythronotus* but with only 16 costal furrows. Much rarer than the others.

All these subspecies are entirely terrestrial and found under stones and logs in woods. Eggs laid in a little package under stones in damp places. The young possess gills when hatched, but very soon lose them. The most abundant salamander, found everywhere, specially in the mountains.

10 *Plethodon glutinosus* Green

De Kay. *Salamandra glutinosa*, the blue-spotted salamander, p. 81, pl. 17, fig. 42

Skin covered with a milky secretion. Black, usually with bluish white blotches and specks; head, body and tail continuous and rounded. Much like *Amblystoma jeffersonianum*, but has lighter spots and shorter digits. 14 costal furrows. Length 5-7 inches.

Entirely terrestrial and found in the mountains, where it prefers the coolest spots. Both in rocky localities and in forest mold and fallen logs.

11 *Gyrinophilus porphyriticus* Green

De Kay. *Salamandra salmonea*, salmon-colored salamander, p. 75,
pl. 16, fig. 29

Yellow or purplish brown or salmon-colored, irregularly blotched with gray, white below, tail rounded at base. 16 costal furrows. Length 6 inches.

An aquatic mountain form, preferring cool mountain springs and swamps to streams.

"This is the only one of our eastern salamanders that attempts defense. It snaps fiercely but harmlessly and throws its body into contortions." *Cope*

12 *Spelerpes bilineatus* Green

De Kay. *Salamandra bilineata*, the striped back salamander, p. 77,
pl. 23, fig. 67

Yellow; back with a tinge of brown which is bordered by a darker brown line; belly yellow, unspotted; tail slender and compressed, longer than rest of animal. 14 costal grooves between the limbs. Length 3 inches.

Occurs all over the state; in shallow, stony brooks, but occasionally found under stones or bark. Very active and behaves like *Desmognathus fusca*, with which it is frequently found.

13 *Spelerpes longicauda* Green

Cave salamander

De Kay. *Salamandra longicauda*, long-tailed salamander, p. 78,
pl. 17, fig. 41

Bright lemon yellow, back and sides covered with black specks running into bands on the tail; belly unspotted; tail one and one half times as long as body and very compressed. 12 costal grooves. Length 5 inches.

Found in rocky ground and in fissures and caves. Said by De Kay ('42) and W. H. Smith ('82) to be aquatic. Probably rare.

14 *Spelerpes ruber* Daudin

De Kay. *Salamandra rubra*, red salamander, p. 80, pl. 17, fig. 43

Orange red, with numerous crowded dark spots; between these is a clouding of dark red brown; under surface with very small black

dots. Almost as stout as *Amblystoma punctatum*, but no neck; head passing into body, which is of the same diameter throughout and passes insensibly into the square tail, which narrows toward tip. 15 costal furrows. Length 6 inches.

Generally aquatic, preferring cold springs, and is found on the ground only after rains. Occasionally found under bark of fallen trees in very damp places.

Family 4 **DESMOGNATHIDAE**

15 **Desmognathus ochrophaea** Baird

Alleghany mountain salamander

Brownish yellow with brown shade on each side; a yellowish dorsal band with few spots; belly unspotted. 13 costal furrows. Length 3 inches. Very like *Spelerpes bilineatus*, but has a more rounded tail, a paler abdomen, and a light bar from eye to mouth. Its habitat is also quite different.

Found in the Adirondacks and Catskills, under bark and decaying trees; not aquatic.

16 **Desmognathus fusca** Rafinesque

De Kay. *Salamandra picta*, dusky salamander, p. 75

Very variable in color, but usually brown above with gray or purplish spots becoming blackish with age; marbled below; eyes prominent; tail as long as head and body. 15 costal grooves. Length 4-5 inches.

This species makes a curious disposition of its eggs, one of the sexes wrapping the albuminous egg string around the body and remaining concealed in a comparatively dry spot till the eggs hatch.

One of the commonest salamanders; found in rapid and shallow streams under stones.

17 **Desmognathus nigra** Green

Uniform black, with a very stout body, the stoutest in fact of our salamanders. 12 costal grooves. Length 6-7 inches.

Found in Pennsylvania and may be taken in southern part of state in the mountains. Habits like those of *D. fusca*; found under the stones in cold springs and streams in the mountains; very agile and not easily caught.

Family 5 PLEURODELIDAE

*Newts*18 *Diemictylus viridescens*, Rafinesque*Newt, eft*

De Kay. Triton millepunctatus, crimson spotted triton, newt, p. 84, pl. 15, fig. 33, 34.

Brownish olive above; straw-colored or dirty white below; each side with a row of three to six scarlet spots, each with a dark border; very small dots all over. 12 obscure costal furrows. Length $3\frac{1}{2}$ inches.

Very common in ponds everywhere. The only one of our salamanders which swims around in deep water and does not live on the bottom or under stones. Eggs laid one at a time in the axils of leaves of water plants.

Var. *miniatus**Red eft*

De Kay. Salamandra coccinea, the scarlet salamander, p. 81, pl. 21, fig. 54 b

Very similar, but bright vermilion red; skin rougher. It is found in the same region but away from water; under stones, etc. coming out after rain. Probably a form of the preceding, its peculiarities being due to life out of water.

Order 3 (ANURA) SALIENTIA

Tailless batrachians

Body short and broad; all four limbs present, the hinder limbs long and strong, adapted for leaping; lower jaw usually toothless; tail wanting in the adult.

The eggs are laid in compact gelatinous masses, usually attached to sticks or weeds, in the water. The young tadpoles have external gills when first hatched, but these are soon covered over by a gill cover, which has a single opening at one side (fig. 4). Both pairs of limbs develop at the same time, but the anterior pair are inclosed in the gill covers and do not break them till a late stage. The tail gradually becomes absorbed, and the gills disappear, while lungs develop, and the animal attains its adult form, which is always frog-like and air-breathing.

- Four families: 1 Bufonidae, toads
 2 Pelobatidae, burrowing toads
 3 Hylidae, tree frogs
 4 Ranidae, frogs

Family 1 **BUFONIDAE**

Represented by one species.

19 **Bufo lentiginosus** (Shaw)

Common toad

De Kay. *Bufo americanus*, p. 67, pl. 19, fig. 46 (young); pl. 20, fig. 52 (adult)

Yellowish brown with a yellow vertebral line and some brownish spots, but variable; adults very warty; young smooth.

Common everywhere. Their eggs are laid in the spring and are inclosed in a long, thin-walled tube of transparent albumen, which lies in strings on the bottom of the ponds where they are laid. The young attain the adult form at a very much earlier period of their life than the frogs.

Family 2 **PELOBATIDAE**

Burrowing toads

Represented by one species.

20 **Scaphiopus holbrookii** Harlan

Spadefoot

De Kay. *Scaphiopus solitarius*, the hermit spade foot, p. 66, pl. 19, fig. 47

Olive brown, a yellowish band on each side from eye to coccyx; a horny, spadelike process on each side of hind foot. Widely distributed, but rarely seen. It remains in burrows which it digs in the earth and lays its eggs in temporary ponds which are formed by rain. Metamorphosis may be very rapid.

Reported by De Kay from Rockland county.

Family 3 **HYLIDAE**

Tree frogs

Small forms, generally inhabiting trees or bushes and frequently possessing the power of adapting their color to the color of the object on which they rest. Generally with the tips of their toes expanded to form disks. Eggs laid in water, in smaller packages than those of the true frogs.

21 Chorophilus triseriatus Wied.

Light, ash colored, with about six dark stripes running back from head; legs blotched; toes without disks Length 1 inch. Found in southern part of state.

22 Acris gryllus Le Conte*Cricket frog*

De Kay. *Hylodes gryllus*, the cricket *Hylodes*, p. 70, pl. 22, fig. 61

Hind legs very long; brown or gray above, with a blackish triangle between eyes; borders of this are green and are continued as a band to the end of the body; sides with three oblique bands; has considerable power of changing its color; ends of toes not expanded. Length $1\frac{1}{2}$ inches.

Found in southern part of state. Frequents the muddy borders of the water, into which it leaps when alarmed. A very strong leaper and is never found on trees.

23 Hyla pickeringii Storer*"Peeper"*

De Kay. *Hylodes pickeringi*, Pickering's tree toad, p. 69, pl. 20, fig. 51

Yellowish or reddish brown with a darker X-shaped mark in middle of back, extending in front to eyes and to the sides of the body; below, yellowish white; legs barred transversely; large disks on toes. Length 1 inch.

Probably all over the state. Found in colder upland swamps and meadows in the breeding season. Later, tree toads may be found in low places or on the ground in the woods. Later still, they climb the trees, and their voices are almost the last sound heard in the fall.

24 Hyla versicolor Le Conte

De Kay. *Hyla versicolor*, the northern tree toad, p. 71, pl. 21, fig. 53a

Green, gray or brown, varying considerably, as its name indicates, with the color of the object on which it rests; V-shaped black blotches on the back; below, white; behind, yellow; skin, warty; large disks. Length 2 inches.

The tree frog par excellence of our state; found on trees and fences; lays its eggs in small packages on blades of grass in the water.

Family 4 **RANIDAE***Frogs*

Usually fair sized forms; strongly developed hind legs; hind feet well webbed and no disks on toes; mostly water-inhabiting forms.

25 *Rana virescens* Kalm

De Kay. *Rana halecina*, the shad frog, common frog, leopard frog, p. 63, pl. 20, fig. 49

Green, with irregular black blotches edged with white; these mostly in two irregular rows on back; legs barred above; belly pale; head rather long. Length $2\frac{3}{4}$ inches.

Probably the commonest of the frogs; found in moist places and marshes. The first species heard in the spring along with *Acris gryllus*. Frequently lives in swarms.

26 *Rana palustris* Le Conte*Pickerel frog*

De Kay. *Rana palustris*, p. 62, pl. 22, fig. 60

Light brown with two rows of large, oblong square blotches of dark brown on back, one or two on sides; a brown spot above eye; dark band from nostril to eye; upper jaw white spotted with black. Length 3 inches.

Very widely distributed, from mountains in north of state to salt marshes on coast. Usually found in cold springs and streams, and is seen more frequently than any other frog in the grass.

27 *Rana septentrionalis* Baird*Northern frog*

Brown or olive, with paler, wormlike markings over the back and legs; sometimes a few dark blotches behind. Length $2\frac{1}{2}$ inches.

Reported from northern part of the state. An entirely aquatic species.

28 *Rana clamata* Daudin

De Kay. *Rana fontinalis*, the spring frog, p. 62, pl. 21, fig. 54a

Greenish or brownish, shading anteriorly to a bright green; rounded brown spots all over the back; beneath, grayish white; legs with several transverse bands. Length 3 inches.

Aquatic, haunting all kinds of waters; lives singly or in pairs.

29 *Rana catesbiana* Shaw*Bullfrog*

De Kay. *Rana pipiens*, p. 60, pl. 19, fig. 48

Greenish of varying shades, with small, faint dark spots above; head usually bright green; lower side silvery white with pale blotches instead of pure white as in *R. clamata*. Length 5–8 inches.

The largest of our frogs. Found in larger ponds and streams, specially where there is underbrush.

30 *Rana sylvatica* Le Conte

De Kay. *Rana sylvatica*, the wood frog, p. 64, pl. 21, fig. 54 (adult); pl. 20, fig. 50 (young)

Pale reddish brown; arms and legs barred above; head small, pointed; dark brown band from eye to arm. Femur and tibia about equal and considerably more than half length of body. Length 1½ inches.

Common in woods. In the highlands of the Hudson it appears about the end of March and lays its eggs in ponds and ditches; then very noisy. Later, in May, it becomes quiet (Mearns).

31 *Rana cantabrigensis* Baird

“Very similar to preceding, but tibia equals one half length of body; a narrow pale line along thighs behind; a dorsal line from snout to arms; back sometimes with dark spots; no outer metatarsal tubercle.”

Habits similar to preceding. Probably in northern part of state.

COLLECTING AND PREPARING

Probably the best way to collect reptiles and batrachians is by shooting them with small shot cartridges in a small rifle or pistol. A shotgun with an “auxiliary barrel” may also be used.¹ Many specimens may be taken by a quick grab with the fingers, but this is not always an agreeable experience for most people. For the Urodela a dip net is very useful, and usually frogs may be taken in that way. For snakes a slip noose of fine wire tied to the end of

¹ These directions are taken almost entirely from the *Directions for collecting reptiles and batrachians* by Leonhard Stejneger, U. S. nat. mus. Bul. 39.

a stick may be used, or a forked stick with which to pin the animal to the ground.

If not dead when taken, specimens may be killed by dropping into alcohol. Snakes may be killed by taking them by the end of the tail and giving them a quick snap which will dislocate the vertebrae.

The prepared specimens will keep better if the alcohol is injected into the body cavity with a hypodermic syringe. If this is not at hand, they may be slit open along the ventral side with a sharp-pointed pair of scissors. In the case of snakes, short slits should be made at intervals. It is well to keep the mouths of specimens open by a wad of cotton or paper; and turtles should have the feet drawn out. Alcohol of the full commercial strength should not be used for preserving. It is much better to put reptiles in alcohol diluted with an equal part of water for the first 24 hours and then into alcohol with one fourth of its volume of water. For batrachians, alcohol even weaker than this should be used; at first with two thirds water and after 24 hours with one third water.

Labels of strong paper should be attached to the specimen but should never be tied around the neck. For lizards and salamanders, fasten it around the body just behind the fore legs; for frogs and toads, in front of the hind legs; for snakes, around the body at about the anterior third; and for turtles to one of the legs. The labels should be written with a soft lead pencil and should contain: 1) the exact locality where captured; 2) the character of the soil and vegetation where the specimen was found, whether on sand, among rocks, under logs or stones, in holes, swamp, meadow, forest or any such observations; 3) date of capture; 4) collector's name.

After soaking in alcohol for from one to two weeks, according to size, they are ready to be transported. For this purpose, a cigar box, an old tomato can, or, better still, an empty baking powder can, will serve. Take some cotton batting, soak it in alcohol and squeeze it nearly dry; then wrap each individual specimen up and pack solidly in the box or can; when the can is full, add as much alcohol as the contents will hold without dripping; wrap the parcel in several thicknesses of strong paper, tie securely and forward by mail, if not too large, to the State Museum, Albany N. Y.

If there are not enough specimens to fill the can, fill it up with cotton. Do not use glass, as it is liable to break.

Living specimens of any of the forms except the larger turtles would be specially valuable and may safely be sent by express (collect). They are best sent in soft damp moss so as to keep them from jarring.

Notes on the following points are greatly to be desired: the occurrence of species in any locality and the conditions under which they were found; their first appearance in the spring and frequency of occurrence throughout the summer; their food and mode of life and their times of breeding and breeding habits.

Any notes or specimens sent to the museum will be acknowledged and full credit given in the Museum reports and any further publications.

INDEX

The superior figures tell the exact place on the page in ninths; e. g. 399³ means page 399, beginning in the third ninth of the page, i. e. about one third of the way down.

- Abbot, C. C.**, cited, 379⁹
 Abdominal plates, defined, 362⁴
Aceris gryllus, 405²
 Adder, blowing, 368¹
Agkistrodon contortrix, 385⁴-86²
 Alleghany hellbender, 398²
 Alleghany mountain salamander, 402³
 Allen, Glover M., cited, 384⁵
 Allen, J. A., cited, 371⁹
Amblystoma conspersum, 399³
 jeffersonianum, 399⁷
 opacum, 398⁷
 punctatum, 399¹
 tigrinum, 399⁵
Amblystomidae, 398⁵-99⁹
American naturalist, check list of ser-
 pents published in, 156³
 Amphibians, 396¹-407⁷
Amyda mutica, 392²
 Anal plate, defined, 362⁵
 Anatomic characters of serpents, 360²
Ancistrodon, 360⁸, 335²
 contortrix, 378⁸, 385³-86²
 piscivorus, 378²
 Antecular plates, defined, 362³
 Anteorbital plates, defined, 362³
Anura, 396³, 403⁶-7⁷; anatomy, 403⁷;
 metamorphosis, 403⁸; families, 404¹
Aramochelys odorata, 393³
Aspidonectes spinifer, 392³
- Baird, Spencer F.**, cited, 355⁴, 356⁴,
 369⁷
 Banded rattlesnakes, 361¹, 387³-88⁹
Bascanion constrictor, 370⁶-71⁴
Batrachia, 396¹-407⁷; breeding, 396⁵;
 food, 396⁸; habitat, 396³; metamor-
 phosis, 396³; orders of, 396⁵
Batrachians, 389-409; collecting and
 preparing, 407⁷-9⁴
 tailless, 403⁷-7⁷
- Bean, Tarleton, referred to, 383⁶
 Black snake, 370⁶-71⁴
 Blanding's tortoise, 395⁷
 Blotched salamander, 398⁷
 Blowing adder, 368¹
 Blue-spotted salamander, 400⁸-1¹
 Blue-tailed lizard, 390⁶
 Blunt-nosed salamanders, 398⁵-99⁹
 Box tortoise, 395⁹
 Box turtle, 392⁹-93⁵, 395⁹
 Breeding habits of snakes, 360⁷
 Brown snake, 380⁷-81³
 Dekay's, 380¹
Bufo americanus, 404³
 lentiginosus, 404³
Bufo *americanus*, 404³
 Bullfrog, 407¹
 Burrowing toad, 404⁵
- Calamaria amoena**, 366⁷-67²
Callopeltis obsoletus, 372³
 vulpinus, 371⁴-72²
 Carinate scales, defined, 362⁶
Carphophiops, 360⁹, 364⁹
 amoenus, 366⁷-67²
 Cave salamander, 401⁷
 Chain snake, 375⁷-76⁷
Chelonia, 391³-95⁹; anatomy, 391³;
 breeding, 391⁶; families of, 391⁷;
 habitat, 391⁷
Chelonura serpentina, 392⁷
Chelopus guttatus, 395⁵
 insculptus, 395³
 muhlenbergii, 395²
Chelydra serpentina, 392⁶
Chelydridae, 392⁵
Chorophilus triseriatus, 405¹
Chrysemys marginata, 394²-95¹
 picta, 394⁷
Cistudo blandingii, 395⁷
 carolina, 395⁵

- Classification of serpents, 359⁴-60¹
Clonophis kirtlandi, 379⁶
 Collecting and preparing reptiles and batrachians, 407¹-9⁴
 Color key to species of serpents, 365³-66⁵
Coluber, 360⁸, 364⁷
 allegghaniensis, 372²
 constrictor, 370⁶-71⁴
 eximius, 374¹-75⁴
 getulus, 375⁸-76⁷
 obsoletus obsoletus, 372²
 punctatus, 367³
 vernalis, 369²
 vulpinus, 356⁶, 371⁴-72²
Colubridae, 364⁴, 366⁶-85²
 Common frog, 406²
 Common lizard, 390³
 Common toad, 404³
 Cope, Edward D., cited, 359⁷, 362⁸, 368⁶, 372¹, 374⁴, 374⁵, 376⁹, 378⁸, 379⁵, 379⁹, 383³, 384⁴, 385², 387¹, 389⁶, 391², 398⁹, 401⁴
 Copperhead, 361², 385³-86²
 Cricket frog, 405²
 Cricket *Hylodes*, 405³
 Crimson spotted triton, 399², 403²
Crotalidae, 361², 365¹, 385²-88⁹
Crotalophorus tergeminus, 386³-87²
Crotalus, 360⁸, 365²
 durissus, 387³-88⁹
 horridus, 387³-88⁹
Cryptobranchidae, 398¹
Cryptobranchus allegheniensis, 398²
Cyclophis, 360⁸, 364⁶
 aestivus, 357², 369⁸-70⁵
De Kay, James E., cited, 355⁴, 363⁵, 359⁶, 367¹, 367⁶, 368⁶, 369⁵, 372⁴, 374¹, 375⁹, 381², 385⁸, 386⁸, 388³, 389³, 392³, 394², 399⁶, 399⁸, 401⁸, 404⁸
 De Kay's brown snake, 380¹
Desmognathus fusca, 402⁵
 nigra, 402⁷
 ochrophaea, 402³
Diadophis, 360⁹, 364⁹
 punctatus, 367³
 Diamond back, 394²
Diemictylus viridescens, 403²
 Distribution of serpents, 363⁴-64³
 Ditmars, Raymond L., cited, 363¹, 368⁶, 369⁵, 370², 375¹, 380⁶, 383⁶, 385⁸, 388⁶
 Dusky garter snake, 384³
 Dusky salamander, 402⁵
 Dusky triton, 399⁷
Eft, 403², 403⁵
Emydidae, 393⁵-95⁹
Emydoidea blandingii, 395⁷
Emys geographica, 393⁷
 guttata, 395⁵
 insculptus, 395⁴
 muhlenbergii, 395²
 palustris, 394³
 picta, 394⁷
 pseudogeographicus, 393⁹-94²
 rubriventris, 394⁴
Eumeces quinelineatus, 390⁶
Eutaenia, 360⁸, 364⁵
 brachystoma, 382¹
 saurita, 381⁴
 sirtalis, 363¹, 382⁴-83¹
 dorsalis, 384⁴
 graminea, 383¹
 obscura, 384²
 ordinata, 383³
 pallidula, 384⁷-85²
 sirtalis, 383⁷-84²
Farr, M. S., referred to, 383⁶
 Fence lizard, 390³
 Four toed salamander, 400²
 Fox snake, 371⁴-72²
 Frogs, 406¹-7⁷
 cricket, 405²
 tree, 404⁸-5⁹
 Frontal plate, defined, 361⁹-62⁷
Garter snake, 362⁸, 382⁴-83¹
 dusky, 384³
 green, 383³
 red, 384⁴
 spotted, 383⁴
 striped, 383⁷-84²
Gastrosteges, defined, 362⁴
 Gebhard, John, jr, cited, 356⁵, 376², 386³
 Geographic tortoise, 393⁷

Giant salamander, 398¹
 Granulated salamander, 399⁷
Graptemys geographicus, 393⁷
 pseudogeographicus, 393⁸-94²
 Green garter snake, 383⁷
 Green snake, rough, 369⁸-70⁵
 smooth, 369¹
 Ground lizard, 390⁸-91²
Gyrinophilus porphyriticus, 401²
Hellbender, 398²
Hemidactylium scutatum, 400¹
 Hermit spade foot, 404⁶
Heterodon, 364⁷
 platyrhinos, 368¹
 platyrhinus, 360⁹, 363², 368¹
 Holbrook, J. E., cited, 377⁹, 389³
 Hough, Franklin B., cited, 376¹, 376³
Hyla pickeringii, 405⁵
 versicolor, 405⁷
 Hylidae, 404⁸-5⁹
Hylodes gryllus, 405³
 pickeringi, 405⁵
Inferior labial plates, defined, 362⁴
 Internasal plates, defined, 362²
Jordan, David S., cited, 359⁶, 364⁴, 389⁶,
 394⁶
Keeled scales, defined, 362⁶
 Key to families and genera of snakes,
 364³-65³; to species, 365³-66⁵
 Kinosternidae, 392⁹-93⁵
Kinosternon pennsylvanicum, 393¹
 Kirtland's snake, 379⁶
Labial plates, superior, defined, 362³;
 inferior, defined, 362⁴
 Lacertilia, 390¹
Lampropeltis dolius, 374²
 triangulus, 374⁸-75⁴
 getulus, 375⁵, 375⁸-76⁷
 Large spotted salamander, 399²
 Leather snake, 378⁹-79⁵
 Leather turtle, 392²
Liolepisma laterale, 390⁸-91²
 Leopard frog, 406²

Leptophis aestivus, 369⁸-70⁵
 saurita, 381⁴
Liopeltis, 360⁸, 364⁹
 vernalis, 369¹
 Lizards, 389-409
 Long-tailed salamander, 401⁷
 Loreal plates, defined, 362³
Macauley, James, cited, 387², 387⁸
 MacKay, A. H., cited, 369⁷
Malaclemmys centrata, 394²
 Map turtle, 393⁷
Massasauga, 361², 386³-87²
 Mearns, Edgar A., cited, 363⁷, 367⁷, 368⁷,
 369⁶, 371², 372⁵, 375¹, 378³, 381², 381⁷,
 385⁹, 388⁶, 398⁹, 407⁵
 Melanism, 363³, 368⁵
Menobranchius lateralis, 397³
Menopoma alleghaniensis, 398²
 Milk snake, 362⁵, 374⁵, 374⁷-75⁵
 Morse, Max, cited, 372¹, 377¹, 387²
 Mud puppy, 397³
 Mud tortoise, 393¹
 Mud turtle, 394⁷
 Muhlenberg's tortoise, 395²
 Musk turtle, 393³
Nasal plates, defined, 362³
Natrix, 360⁸, 364⁷
 fasciata, 363², 376⁸-77⁴
 erythrogaster, 356⁹, 377¹
 sipedon, 363⁴, 377⁴-78⁵
 kirtlandii, 379⁶
 leberis, 378⁸-79⁵
 rigida, 378⁵
 sipedon, 376⁸-77⁴, 377⁴-78⁵
Necturus, 396³
 maculatus, 397³
 Nelson, Julius, cited, 379⁹
 Newts, 403¹
 Nomenclature of serpents, 359⁴-60¹; of
 scales, 361²-62⁶
 Nonvenomous snakes, 360¹
 Northern frog, 406⁷
 Northern rattlesnake, 361¹
 Northern tree toad, 405⁸
Occipital plates, defined, 362²
Ophedrys aestivus, 369⁸-70⁵

- Ophibolus*, 360⁸, 364⁸
 getulus, 375⁵
 getulus, 375⁷-76⁷
Osceola, 360⁸, 364⁸
 doliata, 356⁸, 361¹, 374²
 clerica, 374⁵
 triangula, 356⁸, 374⁵, 374⁷-75⁴
Oviparous serpents, 360⁷
Ovoviviparous serpents, 360⁷
- Painted turtle**, 394⁷
Peeper, 405⁵
Pelobatidae, 404⁵
Pickerel frog, 406⁴
Pickering's tree toad, 405⁵
Pine lizard, 390³
Pine snake, 373¹-74²
Pit-vipers, 361²
Pituophis melanoleucus, 373²-74²
Pityophis, 360⁹, 364⁶
 melanoleucus, 357², 373¹-74²
Plethodon cinereus, 400⁴
 cinereus, 400⁴
 dorsalis, 400⁶
 erythronotus, 400⁵
 glutinosus, 400⁸-1¹
Plethodontidae, 400¹-2⁹
Pleurodelidae, 403¹
Pond turtles, 393⁶-95⁹
Postocular plates, defined, 362²
Postorbital plates, defined, 362³
Prairie rattlesnake, 361²
Prefrontal plates, defined, 362¹
Preocular plates, defined, 362³
Proteïda, 396², 397¹
Proteidae, 397²
Pseudemys hieroglyphica, 394⁶
 rubriventris, 394⁴
Pseudogeographic tortoise, 393⁹-94²
- Racer**, 372²
Rana cantabrigensis, 407⁶
 catesbiana, 407¹
 clamata, 406⁸
 fontinalis, 406³
 halecina, 406²
 palustris, 406⁴
Rana pipiens, 407²
 septentrionalis, 406⁷
 sylvatica, 407³
 virescens, 406²
Ranidae, 406¹-7⁷
Rattlesnake, banded or northern, 361¹,
 387³-88⁹
 prairie, 361²
Red-backed salamander, 400⁴
Red-bellied terrapin, 394⁴
Red eft, 403⁵
Red garter snake, 384⁴
Red salamander, 401⁹-2²
Reed, H. D., acknowledgments to, 356⁹,
 357¹; cited, 363⁸, 367⁷, 369⁶, 371³, 372⁹,
 375⁴, 378⁴, 381³, 381⁹, 391²
Reference list, 357³-59³
Regina leberis, 378⁹-79⁵
 rigida, 378⁶
Reptiles, breeding habits, 360⁷; collect-
 ing and preparing, 407⁷-9⁴
Ribbon snake, 381⁴
Ring-necked snake, 367³
Rockland county, snakes of, 363⁸
Rostral plate, defined, 362²
Rough green snake, 369⁸-70⁵
- Salamanders**, 397⁶-403⁶
Salamandra bilineata, 401⁴
 coccinea, 403⁵
 erythronota, 400⁴
 fasciata, 398⁷
 glutinosa, 400⁸-1¹
 granulata, 399⁷
 longicauda, 401⁷
 picta, 402⁵
 rubra, 401⁹-2²
 salmonea, 401²
 subviolacea, 399²
Salientia, 396³, 403⁶-7⁷
Salmon-colored salamander, 401²
Salt marsh turtle, 394²
Salt water terrapin, 394³
Scales, nomenclature, 361⁹-62⁶
Scaphiopus holbrookii, 404⁶
 solitarius, 404⁶
Scarlet salamander, 405⁵
Sceloporus undulatus, 390³

- Scincus fasciatus*, 390⁶
 Scorpion, 390⁶
 Serpents of the northeastern United States, 356-88
 Shad frog, 406²
 Sherwood, W. L., cited, 389⁴
Sistrurus, 360⁸, 365²
 catenatus catenatus, 356⁵, 386³-87²
 Slider, 394⁴
 Smaller spotted salamander, 359³
 Smith, W. H., cited, 376⁹, 387¹, 389⁴, 400³, 401⁸
 Smooth green snake, 369¹
 Snakes, breeding habits, 360⁷; collecting and preparing, 407¹-9⁴
 Snapping turtles, 392⁵
 Soft-shelled turtles, 391²-92⁵, 393⁴
 Southern tier, no records, 364¹
 Southwick, E. B., cited, 388⁶
 Spadefoot, 404⁶
 Speckled tortoise, 395⁵
Spelerpes bilineatus, 401⁴
 longicauda, 401⁶
 ruber, 401⁹-2²
 Spotted garter snake, 383⁴
 Spotted salamander, 399¹
 Spotted tortoise, 395⁵
 Spring frog, 406⁸
 Stejneger, Leonhard, cited, 361⁶, 377², 407⁹
Sternothaerus odoratus, 393⁴
 Stiff snake, 378⁵
 Stink pot, 393³
Storeria, 360⁸, 364⁶
 dekayi, 380¹, 380²
 occipitomaculata, 356⁵, 380⁷-81³
 Striped-back salamander, 401⁴
 Striped garter snake, 383⁷-84²
 Subcaudal plates, defined, 362⁵
 Superciliary plates, defined, 362¹
 Superior labial plates, defined, 362³
 Swift lizard, 390³
 Temporal plates, defined, 362⁴
 Terry, W. J., cited, 391²
Thamnophis sauritus, 381⁴
 sirtalis, 382⁵-83¹
 dorsalis, 384⁵
 ordinatus, 383⁴
 Tiger salamander, 399⁵
 Toad, burrowing, 404⁵
 common, 404³
 northern tree, 405⁸
 Pickering's tree, 405⁵
 tree, 405⁵, 405⁸
 Tortoises, 389-409, 391³-95⁹
 Tree frogs, 404⁸-5⁹
 Tree toad, northern, 405⁸
 Pickering's, 405⁵
Trigonocephalus contortrix, 385⁴-86²
 Trionychidae, 391²-92⁵
Trionyx ferox, 392⁴
 Triton, 399⁵
 crimson spotted, 399², 403²
 dusky, 399⁷
Triton millepunctatus, 403²
 niger, 399⁷
 tigrinus, 399⁵
Tropidolepis undulatus, 390⁴
Tropidonotus dekayi, 380¹
 leberis, 378⁹-79⁵
 niger, 377⁹
 rigidus, 378⁵
 sipedon, 377⁴-78⁵
 taenia, 382⁴-83¹
 Turtles, 391³-95⁹
 Urodela, 396³, 397²-403⁹; metamorphosis, 397⁶; families, 397⁸
 Urosteges, defined, 362⁵
 Variation in animals, 362⁷-63⁴; of *Eutaenia sirtalis*, 382⁷; of *Osceola doliata*, 374⁴
 Venomous snakes, 361¹
 Vertical plate, defined, 361⁹-62⁷
 Wallace, W. Seward, acknowledgments to, 356⁹, 357²; cited, 363⁹, 367¹, 367⁷, 368⁷, 369⁷, 370², 371⁴, 372⁹, 373⁹, 375⁵, 378⁵, 380⁷, 381³, 381⁹, 383⁶, 386¹
 Water snake, 377⁴-78⁵
 Wood frog, 407⁴
 Wood terrapin, 395⁴
 Wood tortoise, 395⁴
 Worm snake, 366⁷-67²
 Zamenis, 360⁸, 364⁹
 constrictor, 370⁶-71⁴

University of the State of New York

New York State Museum

MUSEUM PUBLICATIONS

Any of the University publications will be sold in lots of 10 or more at 20% discount. When sale copies are exhausted, the price for the few reserve copies is advanced to that charged by secondhand booksellers to limit their distribution to cases of special need. Such prices are inclosed in brackets.

All publications are in paper covers, unless binding is specified.

Museum annual reports 1847–date. *All in print to 1892, 50c a volume, 75c in cloth; 1892–date, 75c, cloth.*

These reports are made up of the reports of the director, geologist, paleontologist, botanist and entomologist, and museum bulletins and memoirs, issued as advance sections of the reports.

Geologist's annual reports 1881–date. Rep'ts 1, 3–13, 17–date, O.; 2, 14–16, Q.

The annual reports of the early natural history survey, 1836–42 are out of print. Reports 1–4, 1881–84 were published only in separate form. Of the 5th report 4 pages were reprinted in the 39th museum report, and a supplement to the 6th report was included in the 40th museum report. The 7th and subsequent reports are included in the 41st and following museum reports, except that certain lithographic plates in the 11th report (1891), 13th (1893) are omitted from the 45th and 47th museum reports.

Separate volumes of the following only are available.

Report	Price	Report	Price	Report	Price
12 (1892)	\$.50	16	\$ 1	19	\$.40
14	.75	17	.75	20	<i>In press</i>
15	1	18	.75		

In 1898 the paleontologic work of the state was made distinct from the geologic and will hereafter be reported separately.

Paleontologist's annual reports 1899–date.

See fourth note under Geologist's reports.

Bound also with museum reports of which they form a part. Reports for 1899 and 1900 may be had for 20c each. Beginning with 1901 these reports will be issued as bulletins.

Botanist's annual reports 1869–date.

Bound also with museum reports 22–date of which they form a part; the first botanist's report appeared in the 22d museum report and is numbered 22.

Reports 22–41, 48, 49, 50 and 52 (Museum bulletin 25) are out of print; 42–47 are inaccessible. Report 51 may be had for 40c; 53 for 20c; 54 for 50c. Beginning with 1901 these reports will be issued as bulletins.

Descriptions and illustrations of edible, poisonous and unwholesome fungi of New York have been published in volumes 1 and 3 of the 48th museum report and in volume 1 of the 49th, 51st and 52d reports. The botanical part of the 51st is available also in separate form. The descriptions and illustrations of edible and unwholesome species contained in the 49th, 51st and 52d reports have been revised and rearranged, and combined with others more recently prepared and constitute Museum memoir 4.

Entomologist's annual reports on the injurious and other insects of the State of New York 1882–date.

Bound also with museum reports of which they form a part. Beginning with 1898 these reports have been issued as bulletins. Reports 3–4 are out of print, other reports with prices are:

Report	Price	Report	Price	Report	Price
1	\$.50	8	\$.25	13	\$.10
2	.30	9	.25	14 (Mus. bul. 23)	.20
5	.25	10	.35	15 (" 31)	.15
6	.15	11	.25	16 (" 36)	.25
7	.20	12	.25	17	<i>In press</i>

Reports 2, 8–12 may also be obtained bound separately in cloth at 25c in addition to the price given above.

UNIVERSITY OF THE STATE OF NEW YORK

Museum bulletins 1887-date. O. *To advance subscribers, \$2 a year or 50c a year for those of any one division: (1) geology, including zoology, archeology and mineralogy, (2) paleontology, (3) botany, (4) entomology.*

Beginning with bulletin 12 bulletins are also found with the annual reports of the museum as follows:

12-15, 48th rep't (1894) v. 1	32-34, 54th rep't v. 1	} <i>In press</i>
16-17, 50th " "	35-36 " v. 2	
18-19, 51st " "	37-44 " v. 3	
20-25, 52d " "	45-48 " v. 4	
26-31, 53d " "	49- 55th rep't	

Volume 1. 6 nos. \$1.50 in cloth

- 1 Marshall, W: B. Preliminary List of New York Unionidae. 20p. Mar. 1892. 5c.
- 2 Peck, C: H. Contributions to the Botany of the State of New York. 66p. 2pl. May 1887. [35c]
- 3 Smock, J: C. Building Stone in the State of New York. 152p. Mar. 1888. *Out of print.*
- 4 Nason, F. L. Some New York Minerals and their Localities. 20p. 1pl. Aug. 1888. 5c.
- 5 Lintner, J. A. White Grub of the May Beetle. 32p. il. Nov. 1888. 10c.
- 6 ——— Cut-worms. 36p. il. Nov. 1888. 10c.

Volume 2. 4 nos. [\$1.50] in cloth

- 7 Smock, J: C. First Report on the Iron Mines and Iron Ore Districts in New York. 6+70p. map 58x60cm. June 1889. *Out of print.*
- 8 Peck, C: H. Boleti of the United States. 96p. Sep. 1889. [50c]
- 9 Marshall, W: B. Beaks of Unionidae inhabiting the Vicinity of Albany, N. Y. 24p. 1pl. Aug. 1890. 10c.
- 10 Smock, J: C. Building Stone in New York. 210p. map 58x60cm. tab. Sep. 1890. 40c.

Volume 3. 5 nos.

- 11 Merrill, F: J. H. Salt and Gypsum Industries in New York. 92p. 12pl. 2 maps 38x58, 61x66cm, 11 tab. Ap. 1893. 40c.
- 12 Ries, Heinrich. Clay Industries of New York. 174p. 2pl. map 59x67cm. Mar. 1895. 30c.
- 13 Lintner, J. A. Some destructive Insects of New York State; San José Scale. 54p. 7pl. Ap. 1895. 15c.
- 14 Kemp, J. F. Geology of Moriah and Westport Townships, Essex co. N. Y., with Notes on the Iron Mines. 38p. 7pl. 2 maps 30x33, 38x44 cm. Sep. 1895. 10c.
- 15 Merrill, F: J. H. Mineral Resources of New York. 224p. 2 maps 23x36, 59x67cm. Sep. 1895. 40c.

Volume 4

- 16 Beauchamp, W: M. Aboriginal chipped Stone Implements of New York. 86p. 23pl. Oct. 1897. 25c.
- 17 Merrill, F: J. H. Road Materials and Road Building in New York. 52p. 14pl. 2 maps 34x45, 68x92cm. Oct. 1897. 15c.
Maps separate 10c each, two for 15c.
- 18 Beauchamp, W: M. Polished Stone Articles used by the New York Aborigines. 104p. 35pl. Nov. 1897. 25c.

MUSEUM PUBLICATIONS

- 19 Merrill, F. J. H. Guide to the Study of the geological Collections of the New York State Museum. 162p. 119pl. map 33x43cm. Nov. 1898. 40c.

Volume 5

- 20 Felt, E. P. Elm-leaf Beetle in New York State. 46p. il. 5pl. June 1898. 5c.
 21 Kemp, J. F. Geology of the Lake Placid Region. 24p. 1pl. map 33x34cm. Sep. 1898. 5c.
 22 Beauchamp, W. M. Earthenware of the New York Aborigines. 78p. 33pl. Oct. 1898. 25c.
 23 Felt, E. P. 14th Report of the State Entomologist 1898. 150p. il. 9pl. Dec. 1898. 20c.
 24 ——— Memorial of the Life and entomologic Work of J. A. Lintner Ph.D. State Entomologist 1874-98; Index to Entomologist's Reports 1-13. 316p. 1pl. Oct. 1899. 35c.
 Supplement to 14th report of the state entomologist.
 25 Peck, C. H. Report of the State Botanist 1898. 76p. 5pl. Oct. 1899. *Out of print.*

Volume 6

- 26 Felt, E. P. Collection, Preservation and Distribution of New York Insects. 36p. il. Ap. 1899. 5c.
 27 ——— Shade-tree Pests in New York State. 26p. il. 5pl. May 1899. 5c.
 28 Peck, C. H. Plants of North Elba. 206p. map 12x16cm. June 1899. 20c.
 29 Miller, G. S. jr. Preliminary List of New York Mammals. 124p. Oct. 1899. 15c.
 30 Orton, Edward. Petroleum and natural Gas in New York. 136p. il. 3 maps 13x23, 7x22, 9x14cm. Nov. 1899. 15c.
 31 Felt, E. P. 15th Report of the State Entomologist 1899. 128p. June 1900. 15c.

Volume 7

- 32 Beauchamp, W. M. Aboriginal Occupation of New York. 190p. 16pl. 2 maps 44x35, 93.5x69.5cm. Mar. 1900. 30c.
 33 Farr, M. S. Check List of New York Birds. 224p. Ap. 1900. 25c.
 34 Cumings, E. R. Lower Silurian System of eastern Montgomery County; Prosser, C. S. Notes on the Stratigraphy of Mohawk Valley and Saratoga County, N. Y. 74p. 10pl. map 32.5x44cm. May 1900. 15c.
 35 Ries, Heinrich. Clays of New York: their Properties and Uses. 456p. 140pl. map 93.5x69.5cm. June 1900. \$1, cloth.
 36 Felt, E. P. 16th Report of the State Entomologist 1900. 118p. 16pl. Mar. 1901. 25c.

Volume 8

- 37 ——— Catalogue of Some of the more important Injurious and Beneficial Insects of New York State. 54p. il. Sep. 1900. 10c.
 38 Miller, G. S. jr. Key to the Land Mammals of northeast North America. 106p. Oct. 1900. 15c.
 39 Clarke, J. M.; Simpson, G. B. & Loomis, F. B. Paleontologic Papers 1. 72p. il. 16pl. Oct. 1900. 15c.

Contents: Clarke, J. M. A remarkable Occurrence of Orthoceras in the Oneonta Beds of the Chenango Valley, N. Y.

——— Paropsonema Cryptophya; a peculiar Echinoderm from the Intumescens-zone (Portage Beds) of western New York.

——— Dictyonine Hexactinellid Sponges from the Upper Devonian of New York.

——— The Water Biscuit of Squaw Island, Canandaigua Lake, N. Y.

UNIVERSITY OF THE STATE OF NEW YORK

Simpson, G. B. Preliminary Descriptions of new Genera of Paleozoic Rugose Corals.

Loomis, F. B. Siluric Fungi from western New York.

- 40 Simpson, G. B. Anatomy and Physiology of Polygyra Albolabris and Limax Maximus and Embryology of Limax Maximus. 82p. 28pl. Oct. 1901. 25c.
- 41 Beauchamp, W: M. Wampum and Shell Articles used by New York Indians. 166p. 28pl. Mar. 1901. 30c.
- 42 Ruedemann, Rudolf. Hudson River Beds near Albany and their taxonomic Equivalents. 114p. 2pl. map 24.5x51.5cm. Ap. 1901. 25c.
- 43 Kellogg, J. L. Clam and Scallop Industries of New York. 36p. 2pl. map 25.5x11.5cm. Ap. 1901. 10c.
- 44 Ries, Heinrich. Lime and Cement Industries of New York. *In press.*
Eckel, E. C. Chapters on the Cement Industry.

Volume 9

- 45 Grabau, A. W. Geology and Paleontology of Niagara Falls and Vicinity. 286p. il. 18pl. map 38x84.5cm. Ap. 1901. 65c; cloth 90c.
- 46 Felt, E. P. Scale Insects of Importance and a List of the Species in New York. 94p. il. 15pl. June 1901. 25c.
- 47 Needham, J. G. & Betten, Cornelius. Aquatic Insects in the Adirondacks. 234p. il. 36pl. Sep. 1901. 40c.
- 48 Woodworth, J. B. Pleistocene Geology of Nassau County and Borough of Queens. 58p. il. 9pl. map 35x71cm. Dec. 1901. 25c.

Volume 10

- 49 Ruedemann, Rudolf; Clarke, J: M. & Wood, Elvira. Paleontologic Papers 2. 240p. 13pl. Dec. 1901. 40c.
Contents: Ruedemann, Rudolf. Trenton Conglomerate of Rysedorph Hill.
Clarke, J: M. Limestones of central and western New York Interbedded with bituminous Shales of the Marcellus Stage.
Wood, Elvira. Marcellus Limestones of Lancaster, Erie Co. N. Y.
Clarke, J: M. New Agelacrinites.
— Value of Amnigenia as an Indicator of fresh-water Deposits during the Devonian of New York, Ireland and the Rhineland.
- 50 Beauchamp, W: M. Horn and Bone Implements of the New York Indians. 112p. 43pl. Mar. 1902. 30c.
- 51 Eckel, E. C. & Paulmier, F. C. Catalogue of Reptiles and Batrachians of New York. 64p. il. 1pl. Ap. 1902. 15c.
Eckel, E. C. Serpents of northeastern United States.
Paulmier, F. C. Lizards, Tortoises and Batrachians of New York.
- 52 Clarke, J: M. Report of the State Paleontologist 1901. *In press.*
Felt, E. P. 17th Report of the State Entomologist 1901. *In press.*
Merrill, F: J. H. Directory of Natural History Museums in United States and Canada. *In press.*
Peck, C: H. Report of the State Botanist 1901. *In press.*
Merrill, F: J. H. Geologic Map of New York. *In preparation.*
Bean, T. H. Catalogue of the Fishes of New York. *In press.*
Dickinson, H. T. Bluestone Quarries in New York. *In press.*
Beauchamp, W: M. Metallic Implements of the New York Indians. *In press.*
Whitlock, H. P. Guide to the Mineral Collections of the New York State Museum. *In press.*
Clarke, J: M. & Ruedemann, Rudolf. The Guelph Formation and Fauna of western New York. *In preparation.*
Clarke, J: M. Catalogue of Type Specimens of Paleozoic Fossils in the New York State Museum. *In press.*

University of the State of New York

State Museum

MUSEUM PUBLICATIONS (*continued*)

Museum memoirs 1889-date. Q.

- 1 Beecher, C: E. & Clarke, J: M. Development of some Silurian Brachiopoda. 96p. 8pl. Oct. 1889. *Out of print.*
- 2 Hall, James & Clarke, J: M. Paleozoic Reticulate Sponges. 350p. il. 70pl. Oct. 1899. \$1, cloth.
- 3 Clarke, J: M. The Oriskany Fauna of Becraft Mountain, Columbia Co. N. Y. 128p. 9pl. Oct. 1900. 80c.
- 4 Peck, C: H. N. Y. edible Fungi, 1895-99. 106p. 25pl. Nov. 1900. 75c.
- This includes revised descriptions and illustrations of fungi reported in the 49th, 51st and 52d reports of the state botanist.

Natural history of New York. 30v. il. pl. maps. Q. Albany 1842-94.

DIVISION 1 ZOOLOGY. De Kay, James E. Zoology of New York; or, The New York Fauna, comprising detailed Descriptions of all the Animals hitherto observed within the State of New York with brief Notices of those occasionally found near its Borders, and accompanied by appropriate Illustrations. 5 v. il. pl. maps. sq. Q. Albany 1842-44. *Out of print.*

Historical introduction to the series by Gov. W: H. Seward. 178p.

- v. 1 pt1 Mammalia. 13+146p. 33pl. 1842.
300 copies with hand-colored plates.
- v. 2 pt2 Birds. 12+380p. 141pl. 1844.
Colored plates.
- v. 3 pt3 Reptiles and Amphibia. 7+98p. pt4 Fishes. 15+415p. 1842.
pt3-4 bound together.
- v. 4 Plates to accompany v. 3. Reptiles and Amphibia 23pl. Fishes 79pl. 1842.
300 copies with hand-colored plates.
- v. 5 pt5 Mollusca. 4+271p. 40pl. pt6 Crustacea. 70p. 13pl. 1843-44.
Hand-colored plates: pt5-6 bound together.

DIVISION 2 BOTANY. Torrey, John. Flora of the State of New York; comprising full Descriptions of all the indigenous and naturalized Plants hitherto discovered in the State, with Remarks on their economical and medical Properties. 2v. il. pl. sq. Q. Albany 1843. *Out of print.*

- v. 1 Flora of the State of New York. 12+484p. 72pl. 1843.
300 copies with hand-colored plates.
- v. 2 Flora of the State of New York. 572p. 89pl. 1843.
300 copies with hand-colored plates.

DIVISION 3 MINERALOGY. Beck, Lewis C. Mineralogy of New York; comprising detailed Descriptions of the Minerals hitherto found in the State of New York, and Notices of their Uses in the Arts and Agriculture. il. pl. sq. Q. Albany 1842. *Out of print.*

- v. 1 pt1 Economical Mineralogy. pt2 Descriptive Mineralogy. 24+536p. 1842.
8 plates additional to those printed as part of the text.

DIVISION 4 GEOLOGY. Mather, W: W.; Emmons, Ebenezer; Vanuxem, Lardner & Hall, James. Geology of New York. 4v. il. pl. sq. Q. Albany 1842-43. *Out of print.*

- v. 1 pt1 Mather, W: W. First geological District. 37+653p. 46pl. 1843.
- v. 2 pt2 Emmons, Ebenezer. Second geological District. 10+437p. 17pl. 1842.
- v. 3 pt3 Vanuxem, Lardner. Third geological District. 306p. 1842.
- v. 4 pt4 Hall, James. Fourth geological District. 22+683p. Map and 19pl. 1843.

DIVISION 5 AGRICULTURE. Emmons, Ebenezer. Agriculture of New York; comprising an Account of the Classification, Composition and Distribution of the Soils and Rocks and the natural Waters of the different geological Formations, together with a condensed View of the Meteorology and agricultural Productions of the State. 5v. il. pl. sq. Q. Albany 1846-54. *Out of print.*

- v. 1 Soils of the State, their Composition and Distribution. 11+371p. 21pl. 1846.
- v. 2 Analyses of Soils, Plants, Cereals, etc. 8+343+46p. 42pl. 1849.
With hand-colored plates.

University of the State of New York

v. 3 Fruits, etc. 8+340p. 1851.

v. 4 Plates to accompany v. 3. 93pl. 1851.
Hand-colored.

v. 5 Insects Injurious to Agriculture. 8+272p. 50pl. 1854.
With hand-colored plates.

DIVISION 6 PALEONTOLOGY. Hall, James. Paleontology of New York. 8v. il. pl. sq. Q. Albany 1847-94. *Bound in cloth.*

v. 1 Organic Remains of the lower Division of the New York System. 23+338p. 99pl. 1847. *Out of print.*

v. 2 Organic Remains of lower Middle Division of the New York System. 8+362p. 104pl. 1852. *Out of print.*

v. 3 Organic Remains of the lower Helderberg Group and the Oriskany Sandstone. pt1, text. 12+532p. 1859. [\$3.50].

— pt2, 143pl. 1861. \$2.50.

v. 4 Fossil Brachiopoda of the upper Helderberg, Hamilton, Portage and Chemung Groups. 11+1+428p. 99pl. 1867. \$2.50.

v. 5 pt1 Lamellibranchiata 1. Monomyaria of the upper Helderberg, Hamilton and Chemung Groups. 18+268p. 45pl. 1884. \$2.50.

— — Lamellibranchiata 2. Dimyaria of the upper Helderberg, Hamilton, Portage and Chemung Groups. 62+293p. 51pl. 1885. \$2.50.

— pt2 Gasteropoda, Pteropoda and Cephalopoda of the upper Helderberg, Hamilton, Portage and Chemung Groups. 2v. 1879. v. 1, text. 15+492p. v. 2, 120pl. \$2.50 for 2 v.

v. 6 Corals and Bryozoa of the lower and upper Helderberg and Hamilton Groups. 24+298p. 67pl. 1887. \$2.50.

v. 7 Trilobites and other Crustacea of the Oriskany, upper Helderberg, Hamilton, Portage, Chemung and Catskill Groups. 64+236p. 46pl. 1888. Cont. supplement to v. 5, pt2. Pteropoda, Cephalopoda and Annelida. 42p. 18pl. 1888. \$2.50.

v. 8 pt1 Introduction to the Study of the Genera of the Paleozoic Brachiopoda. 16+367p. 44 pl. 1892. \$2.50.

— pt2 Paleozoic Brachiopoda. 16+394p. 84pl. 1894. \$2.50.

Museum handbooks 1893-date. 7½x12½ cm.

In quantities, 1 cent for each 16 pages or less. Single copies postpaid as below.

H5 New York State Museum. 14p. il. 3c.

Outlines history and work of the museum; with list of staff and scientific publications, 1893.

H13 Paleontology. 8p. 2c.

Brief outline of State Museum work in paleontology under heads: Definition; Relation to biology; Relation to stratigraphy; History of paleontology in New York.

H15 Guide to Excursions in the fossiliferous Rocks of New York. 120p. 8c.

Itineraries of 32 trips covering nearly the entire series of paleozoic rocks, prepared specially for the use of teachers and students desiring to acquaint themselves more intimately with the classic rocks of this state.

H16 Entomology. 8p. *Out of print.*

H17 Geology. *In preparation.*

Maps. Merrill, F. J. H. Economic and geologic Map of the State of New York. 59x67 cm. 1894. *Out of print.*

Scale 14 miles to 1 inch. New edition in preparation.

Printed also with Museum bulletin 15 and the 48th museum report, v. 1.

— Geologic Map of New York. 1901. \$3. Mounted on rollers \$5.

Scale 5 miles to 1 inch.







3 9088 01300 7000